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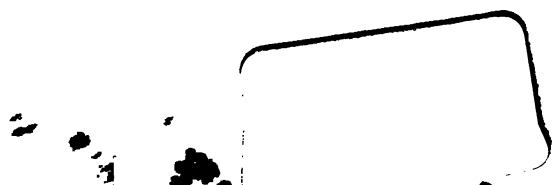
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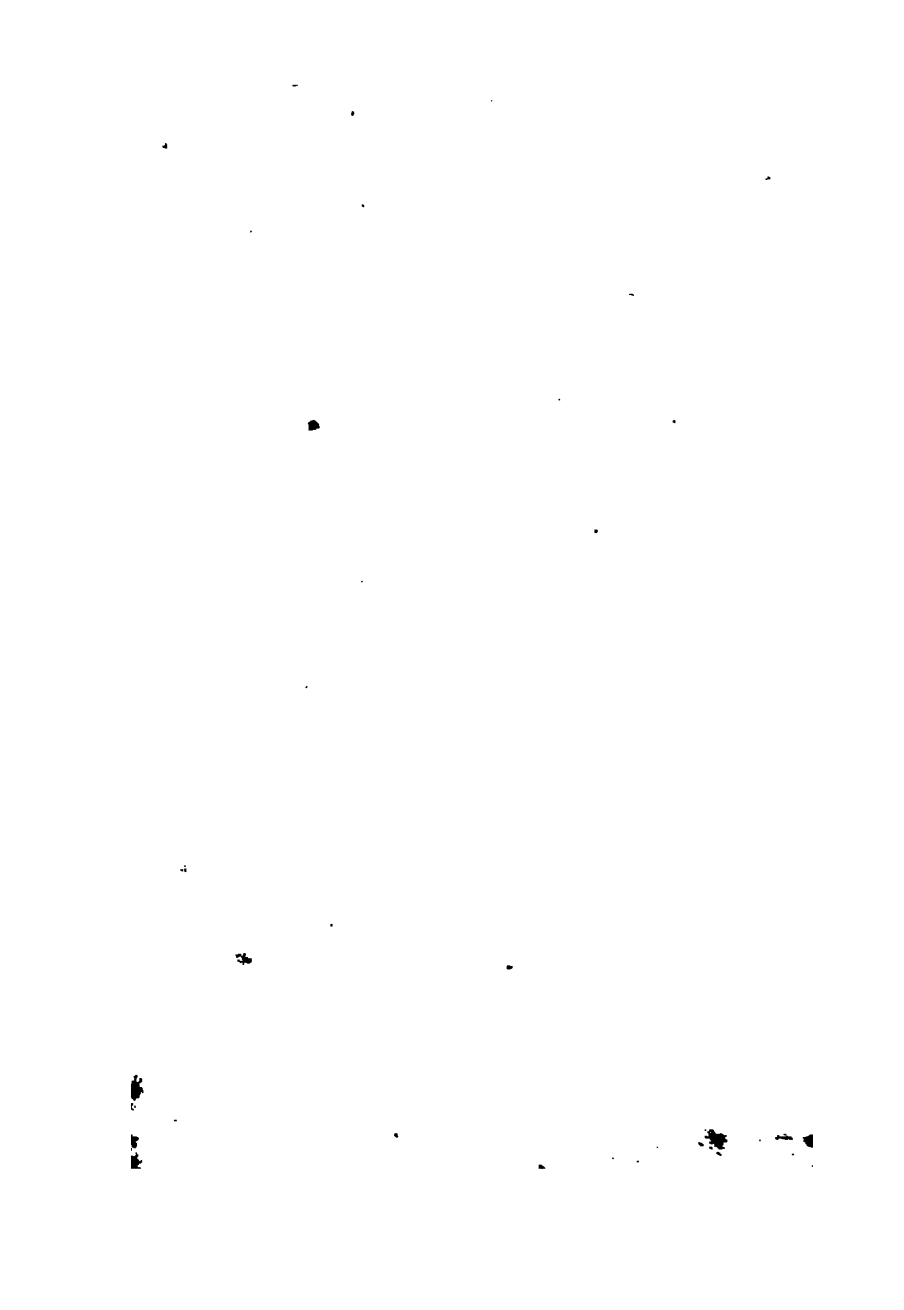
HINTS
TO
YOUNG SHIPMASTERS.
BY
JAMES GRANGE.

PRICE, TWO SHILLINGS AND SIXPENCE.



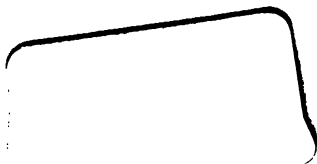
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HINTS
TO
YOUNG SHIPMASTERS

IN
DRAFTING AND CUTTING SHIPS' RIGGING AND
SAILS, PLACING AND FITTING MASTS,
ETC. ETC.;

WITH A
FORM OF SHIPMASTERS' BOOKS AND ACCOUNTS,
AND SEVERAL USEFUL REMARKS.

BY
JAMES GRANGE.

Entered at Stationers' Hall.

NEW EDITION.

Illustrated with Numerous Woodcuts.



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P R E F A C E.

SHIPMASTERS are often put to great inconvenience and trouble in foreign ports, and even in this country in our ports, for want of proper instructions how to spar, rig, and make sails for their ships, when by an unfortunate accident they happen to be dismasted; or when desirous to rig new ships, or alter the rig of old ones. The following Hints are drawn up by one who has experienced these inconveniences; and some other things useful to the Young Shipmaster are added, in the knowledge of which the writer found himself deficient during the first few years of his command. It is divided into Four Parts, viz. :—

1st, THE RIGGING OF SHIPS.

2nd, SAILMAKING.

3rd, BOOK-KEEPING.

4th, STOWAGE OF CARGOES, &c.

This work is not intended for the experienced shipmaster, as in his experience he may know better plans; nor for the landsman—to him it may be unintelligible; but solely for Young Shipmasters and Mates who may not have had an opportunity of studying the matters treated of.

J. G.

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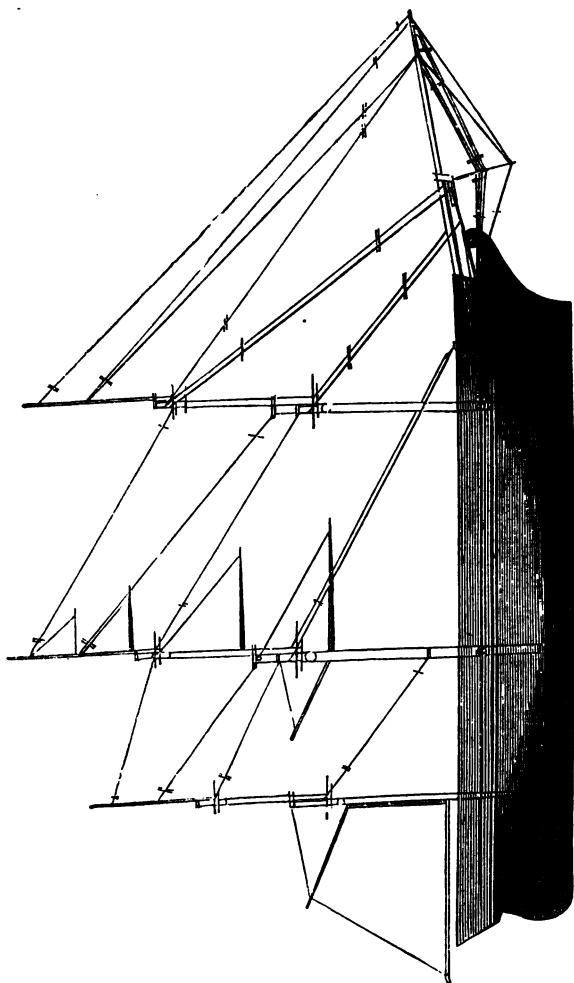
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PART I.
ON MASTS AND RIGGING.

FIG. 1.—STAYS, &c.



HINTS TO YOUNG SHIPMASTERS.

PART I.

DIRECTIONS TO MEASURE A SHIP FOR RIGGING.

HULL AND SPARS.

1st. Take the extreme length of the ship from stemhead to taffrail, and note the centre of the mast partners.

2nd. Find the rake of the bowsprit, thus:—From the rest of bowsprit on outer part of stemhead, draw a horizontal line inwards on night heads; the angle this line makes with stemhead determines the steave of bowsprit;—or make a mould of bowsprit from heel to hounds, place it in position, and with plumb-line and square find its rake, from which (if the ship sits by the stern) subtract her rake (see note below);—or, on the plan, give the steave of bowsprit 20° , which is considered a fair rake.

3rd. Drop a plumb-line from the centre of the partners at the deck to the step of the mast; measure from the centre of step to this plumb-line, and divide it by the number of feet from deck to step for the rake per foot of mast (and note the depth).*

4th. Stretch a line across the deck from dead-eye

* If the ship is not on even keel, which is often the case, find how she sits, thus:—Take a square 10 feet long, which place on keelson, and drop a plumb-line from its top to shoulder, and for every degree the ship sits off the plumb you will have 2 inches of base line, which, if the ship sits by the stern, must be subtracted from your rake, in No. 3.

to dead-eye over centre of partners, and note the depth from this to step.

5th. Raise a tub (bottom up) or flat board to this line immediately above the partners, and on it describe an arc of the circumference of masthead.

6th. Take the distance that each dead-eye is from this arc—these will be your base-lines.

7th. Take the length of the masts from the hounds to heel, to which add the depth of trusseltree and crosstree, from which take the depth of the hold from the line across the deck at dead-eye to step—the remainder will be the perpendicular.

8th. From these, and the length of topmast and topgallantmast, project a figure from any convenient scale of equal parts (the larger the better), as in Figures 1 and 2, which see: this is on the supposition that the masts are perpendicular to the keel.

9th. Set off at masthead above the crosstree the diameter of each shroud that goes over the masthead.

STAYS.

Fore Stay.—Take on your compasses the distance from bottom of bowsprit to aft part of foremast above the rigging, which double, and add the diameter of bowsprit; or measure to hoop on bowsprit, and set up on end through bull's-eyes. This stay is double, and sets up with lashing at masthead—thus, in Figure 1, the dist. is $53\frac{1}{2}$ ft. $\times 2 = 107$ ft., add diameter of bowsprit, 1 ft. 6 in. = whole length 108 ft. 6 in.

Main Stay.—Measure from bull's-eye on bitts, or wherever it sets up to, to aft part of mainmast above the rigging, add semi-diameter of masthead and 2 feet for end, which double. This stay is double, and sets up on both ends to two bull's-eyes in pawl-bitts. Thus, in Figure 1, from bull's-eye to masthead is 80 feet, semi-diameter of masthead 9 in., end 2 ft. = 82 ft. 9 in.—which doubled, gives for whole length of mainstay, 165 feet 6 inches.

Mizen Stay.—Measure from 10 feet above the deck, or wherever it sets up to on mainmast, to aft part of mizenmast above the rigging, to which add diameter of mast, length of masthead (or any length at pleasure for eye), and 2 feet for end. This stay is single, and sets up on end at mainmast. In Figure 1, length 41 ft. + diameter 1 ft. 4 in. + collar 10 ft., end 2 ft. = whole length 54 feet 4 inches.

Fore Topmast Stay.—Measure from bee on bowsprit to after part of topmasthead above the backstays, and from bee to bull's-eye in the bow where it sets up to, and add 2 feet for end, and semi-diameter of topmast, which double. This stay is double, and sets up on end in the head—viz., Figure 1, from bee in bowsprit to topmasthead is 80 feet, and from bee to bull's-eye in head 20 ft., end 2 ft., semi-diameter $\frac{1}{2}$ ft. $\times 2 = 205$.

Main Topmast Stay.—Measure from hoop on masthead, or wherever it sets up to, to after part of maintopmast head above the backstays; add diameter of mast, 7 feet for collar, and 2 feet for end. This stay is single, and sets up on end. $63 + 1 + 7 + 2 = 73$ feet.

Mizen Topmast Stay.—Measure from hoop on mainmast head, or wherever it sets up to, to mizentopmast head above the backstays; add diameter of mast, 5 feet for collar, and 2 feet for end. $33 \text{ ft.} + 9 \text{ in.} + 5 \text{ ft.} + 2 \text{ ft.} = 49$ feet.

Jib Stay.—Measure from jib-boom end to foretopmast head above the foretopmast stay, and from jib-boom end to bull's-eye in bow to which it sets up; add 6 feet for collar, and 2 feet for end, if intended to be set up on end. $93 + 47 + 6 + 2 = 148$ feet.

Flying Jib Stay.—Measure from flying jib boom end to foretopgallant masthead, and from flying jib-boom end to ship's bow where it sets up to; add circumference of mast and 1 foot for end. $110 + 55 + 2 + 1 = 168$.

Fore Topgallant Stay.—Measure from jib-boom end

to foretopgallant masthead, and from jib-boom end to ship's bow; add circumference of mast and 1 foot for end. $105 + 47 + 2 + 1 = 155$ feet.

Fore Royal Stay.—Measure from flying jib-boom end to fore royal masthead, and from flying jib-boom end to ship's bow; add 1 foot for end, and circumference of masthead. $121 + 57 + 1 + 1.9 = 180$ ft. 9 in.

Main Topgallant Stay.—Measure from maintopgallant masthead to foremast cap, or wherever it sets up to; add circumference of topgallantmast, and 1 foot for end. $71 + 2 + 1 = 74$ feet.

Main Royal Stay.—Measure from main royal masthead to the foretopmast crosstree, or wherever it sets up to; add circumference of mast and 1 foot for end. $68 + 1.9 + 1 = 70$ feet 9 inches.

Mizen Topgallant Stay.—Measure from mizen topgallant masthead to main cap; add circumference of mast and 1 foot for end. $36 + 1.9 + 1 = 38$ ft. 9 in.

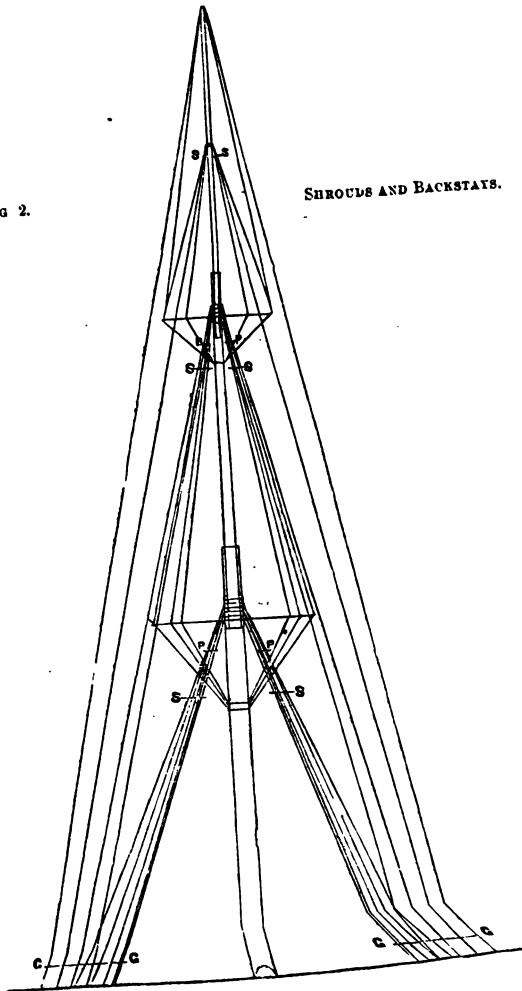
Mizen Royal Stay.—Measure from mizen royal masthead to maintopmast crosstree; add circumference of mast and 1 foot for end. $326 + 1.6 + 1 = 35$ ft.

Martingale Stay.—Measure from jib-boom end to hounds or hoop on martingale, and add 14 inches for splicing in hooks or thimbles. [This stay in the generality of ships is chain and shackles on to a hoop on jib-boom end, and to another on martingale, consequently the neat length is proper.] $27 + 1.2 = 28$ feet 2 inches.

Flying Martingale Stay.—Measure from flying jib-boom end to martingale, and from martingale end to where it sets up to in bow [this, though not the usual way, is recommended for handiness in setting up]; add 6 inches for splicing in hooks at jib-boom end, and 1 foot for end. 35 ft. 6 in. + 25 ft. 6 in. + 6 in. + 1 ft. 6 in. = 62 feet 6 inches.

FIG 2.

SHROUDS AND BACKSTAYS.



SHROUDS.

Draw a base line and erect a perpendicular the height of the mast; mark for trusseltree and crosstree, and for double the diameter of each shroud that goes over the masthead, as in Fig. 2. On the base line mark the respective distances that the dead-eyes are off the mast. (No. 6 of page 4.)

1st Shroud, Starboard side.—Measure from first mark on base line to top of crosstree, and add half circumference of mast and mark it—this is called the middle of the shroud; to these add half circumference of mast, and 6 feet for pendant if wanted. $40 + 2.6 + 2.6 + 6 = 51$ feet.

1st Shroud, Port side, is the diameter of the rope on each leg longer than the starboard one. 51 ft. 6 in.

2nd and 3rd, Starboard.—Measure from second mark on base line to second mark at masthead, and add half circumference of mast; mark this for the middle, then measure from the same masthead mark to third mark on base line, and add half circumference of mast.

$$\left. \begin{array}{l} 2\text{nd}—40 \text{ ft. } 8 \text{ in.} + 2.6 \\ 3\text{rd}—40 \text{ ft. } 9\frac{1}{2} \text{ in.} + 2.6 \end{array} \right\} = 86 \text{ ft. } 5\frac{1}{2} \text{ in.}$$

2nd and 3rd, Port side.—Add the diameter of the rope to each of the 2nd and 3rd starboard shrouds.

$$\left. \begin{array}{l} 2\text{nd}—40 \text{ ft. } 11 \text{ in.} + 2.6 \\ 3\text{rd}—41 \text{ ft. } 0\frac{1}{2} \text{ in.} + 2.6 \end{array} \right\} = 86 \text{ ft. } 11\frac{1}{2} \text{ in.}$$

4th and 5th, Starboard.—Measure from fourth base line mark to fourth masthead mark, and add half circumference of masthead, and mark this for the middle; then measure from the same masthead mark to the fifth base line mark, add half circumference of mast.

$$\left. \begin{array}{l} 4\text{th}—41 \text{ ft. } 9 \text{ in.} + 2.6 \\ 5\text{th}—42 \text{ ft. } 4 \text{ in.} + 2.6 \end{array} \right\} = 89 \text{ ft. } 1 \text{ in.}$$

4th and 5th, Port side.—Add the diameter of the rope to each of the 4th and 5th starboard ones.

$$\begin{array}{l} 4\text{th}—42\text{ ft. } 0\text{ in.}+2\cdot6 \\ 5\text{th}—42\text{ ft. } 7\text{ in.}+2\cdot6 \end{array} \Bigg\} = 89\text{ ft. } 7\text{ in.}$$

The length of the shrouds may be found to the greatest degree of exactness by Trigonometry—the base and perpendicular being given in a right-angled-triangle to find the hypotenuse, the squares of the two former being equal to the square of the latter—thus, for the first shroud starboard side, main rigging, we have for perpendicular from a line across the deck from dead-eye to dead-eye to the

Hounds, - - 36 0
Trusseltree, - 1 3
Cross-tree, - - 0 5

Perpendicular, 37 8— $37\cdot66 \log. 1\cdot57588 \times 2=3\cdot15176$ —Nat. number, - 1418

Base, 13 ft. 5 in.— $13\cdot42 \log. 1\cdot12775 \times 2=2\cdot25550$ —Nat. number, - 180

Log. 3 20357 1598

Length of hypotenuse, - - $\frac{1}{2}$ 1'60178—39'97 ft.

MAIN TOPMAST BACKSTAYS.

Perpendicular, $\sqrt{73\cdot3}$; Base, $16\cdot1=\sqrt{5624}=75\text{ft. } 0\text{in.}$;
and so on for all the others.

TO RAKE A MAST.

ALL Masts should rake a little aft. For the common run of merchant ships the following appears a fair rake:—The foremast to rake 2° , the mainmast 4° , and the mizenmast 6° . For sharp clipper ships this may be a little increased.

Rule to Rake a Mast with Ship on even Keel.—Hold a plumb-line at 10 feet above the deck on after side of mast, and for every degree the mast rakes there will be 2 inches of base in the 10 feet.

the lower crosstrees, and add half circumference of mast and 8 inches for a cut splice. (Fig. 2.) 35 ft. 7 in. + 1 ft. 6 in. + 8 in. = 37 ft. 9 in.

1st Port.—Same as starboard. This shroud goes over the mast with a cut splice. 37 ft. 9 in.

2nd and 3rd Starboard.—Measure from the diameter of the rope higher up than the swifter, to the second base line mark on the crosstree, and add half circumference of mast, and from the same height to third mark on crosstree add half circumference of mast. Thus—

2nd—36 ft. 0 in. + 1 ft. 6 in. + 37 ft. 6 in. }
 3rd—36 ft. 4 in. + 1 ft. 6 in. + 37 ft. 10 in. } = 75 ft. 4 in.

2nd and 3rd Port are each the diameter of the rope longer than the starboard ones. Thus—

2nd—37 ft. 8 in. }
 3rd—38 ft. 0 in. } = 75 ft. 8 in.

Topgallant Rigging.—Measure from the bounds of the mast to each mark on crosstree, and from these to the spider-hoop, and to their sum add circumference of mast. Thus—*1st*, 20 ft. 1 in.; *2nd*, 20 ft. 5 in.; *1st*, 5 ft. 8 in.; *2nd*, 6 ft. 9 in.; circum. 1 ft. 6 in. = 54 feet 5 inches.

The Port Rigging may be cut the same length—54 ft. 5 in. This is the usual method; but it is more preferable to have futtock shrouds, and set them up like the topmast rigging.

Royal Shroud.—Measure from bounds on royal mast to second mark on topmast crosstree, and add half circumference of mast and 6 inches for a cut splice. 35 ft. 2 in. + 6 in. + 6 in. = 36 feet 2 inches.

The *Port* one is the same length. 36 feet 2 in.

Topmast Backstays, Starboard.—Measure from top of topmast rigging to first backstay dead-eye mark on base line, and add half circumference of mast, and measure from the same place to second dead-eye mark on base line, and add half circumference of mast.

76 ft. + 1 ft. 6 in. and 75 ft. 5 in. + 1 ft. 6 in. = 153 feet 6 inches.

Port Backstays are cut the diameter of the rope longer on each than the starboard ones. 153 feet 10 in.

Topgallant Backstays.—Measure from hounds of topgallantmast to its dead-eye mark on base line, and add circumference of mast and 6 inches for eye splice—fit them with eye round masthead, which is much safer than a horse shoe. 94 ft. 5 in. + 1 ft. 6 in. + 6 in. = 96 feet 5 inches.

Port side, the same. 96 feet 5 inches.

Royal Backstay.—Measure from hounds of royal mast to its dead-eye mark on base line, and add circumference of masthead and 6 inches for an eye splice. 109 ft. 4 in. + 1 ft. + 6 in. = 110 feet 10 inches.

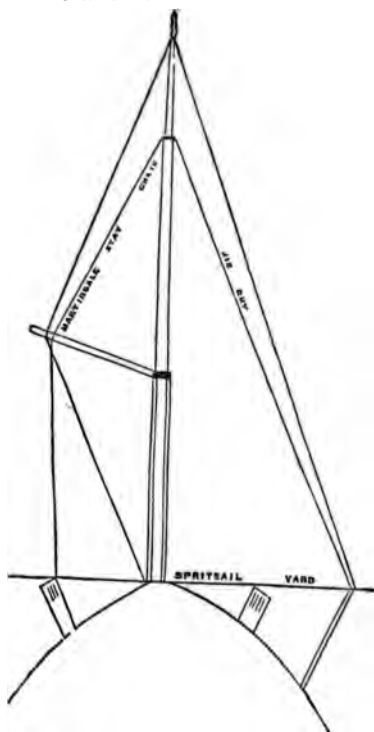
The *Port* one is the same length. 110 feet 10 in.

The *Lower Rigging* is to be cut the exact length of these measurements, and the dead-eyes turned in about 3 feet from the end of the first shroud, and a proportional distance for the others, as at c c in Fig. 2, which may be more correctly found by proportion, thus: measure from crosstree to first dead-eye mark, and from crosstree to the others; then, as the first length is to the second, so is 3 feet to the distance of second dead-eye from end; and as the first is to the third, fourth, and fifth, so is the distance to their respective dead-eyes from ends of shrouds. This is on the supposition that the rope is well stretched, which all rope for standing rigging ought to be; and no rope should be cut short of this under the impression that rope is saved thereby, for the extra length required for lanyard more than makes up for the weight of rope saved. If the topmast rigging sets up on end, $1\frac{1}{2}$ feet must be added to the exact length; if it sets up with lanyard, 8 inches may be taken off. And the same for topgallant and royal rigging.

The Topmast Backstays may be cut 8 inches short of

the exact length, and the *Toppallant* and *Royal Back-stays* twice that length.

FIG. 4.—JIB GUYS AND BACK ROPES.



Jib Guys.—Measure from jib-boom end to base line representing spritsail yard, and from thence to dead-eye in rail, or where it sets up to, and add 1 foot for splicing in hooks; and measure for the flying jib-guys from its boom-end the same way. If rope, cut the jib-guys 1 foot short, and the flying jib-guys 2 feet short, and set up with lanyards. — (Fig. 4.)

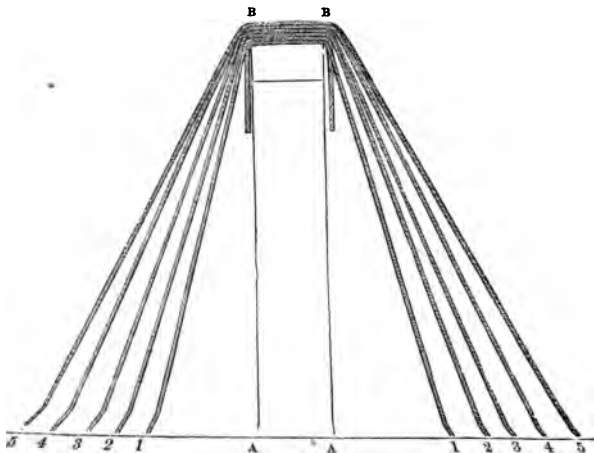
Back-ropes.—Measure from both cat-heads in Fig. 4 to martingale, half the sum of which is the length of each back-rope.

ANOTHER METHOD OF MEASURING RIGGING FOR CUTTING.

THE following method may be practised with advantage in the open air or in a large loft :—That is,

from a base line raise perpendiculars, having the circumference of masts between them, as A B, A B, from which perpendiculars, on base line, mark the places of the dead-eyes, as 1 2 3 4 5; then commence with the right-hand dead-eye mark on starboard side, laying the end of your rope on it, carrying it up to the mast-head at B, across it to B, and down as far as required for pendant, and cut it. Then lay the end of the rope on the port side at dead-eye mark, carry it up over the first cut shroud, bring the end down square with the other, and cut it. Then lay the end of the rope on second dead-eye mark on starboard side, carry it up over last cut shroud and down to third dead-eye mark on port side. Then from second dead-eye mark on port side, carry up over the last and down to third dead-eye mark on starboard side; and so on for the others. Mark each shroud in the centre of the bight, putting a knot on for each shroud. The even numbers belong to the port side. (See Fig. 5.)

FIG. 5.—SIMPLE METHOD TO MEASURE RIGGING.



HOW TO PLACE SEIZINGS.

FOR the *Seizings*, measure from the middle mark in shroud the half circumference of mast, and add the breadth and half breadth of trusseltree for the first shroud on starboard side; for the second and third shroud, to the above add twice the diameter of the rope and the breadth of the seizing; for the fourth and fifth, to the first add four times the diameter of the rope, and twice the breadth of the seizings. Pass the turns downwards.

For the *Port side*, put each seizing on the rope's diameter farther from the centre of the shroud than those of the starboard side.

All Standing Rigging is wormed, parcelled, and served, where it comes in contact with anything; and where it goes round the masthead, parcelling is marled on over the service. The most of rigging now is wormed from end to end, and seems to be approved of. The worming is about once and one-third the length of the rigging, and for an eight-inch rope is six-thread or half-inch. Under the service, six or seven-yarn spun yarn is used. In Fig. 1 the stays are sewed from the marks towards the masts, and from the single mark to the end; In Fig. 2 the shrouds are served and parcelled round the masthead above the marks *s s*, and parcelling marled over all above *p p*.

The first shrouds, when served, are cut a little longer than their measured length, as they are not supposed to stretch so much as a bare rope.

RULES TO DETERMINE SIZE OF RIGGING.

I HAVE seen no rule nor guide whereby the size of the rigging may be determined. The following are proposed—allowing five shrouds on each side for ships under six hundred tons, and six shrouds for ships over that measurement, for the fore and mainmasts; and four shrouds for the former, and five for the latter, for the mizenmast:—

Rule 1.—Take the square root of the length of the mast in feet—this, in inches and parts of an inch, is the circumference of the rope. For example, the extreme length of the mast is 70 feet. What is the size of the rigging?

Mast, 70 logarithm—1·84510, the half which is 0·92255
 $\frac{1}{2}$ ·92255, Nat. number 8·367, or
 about $8\frac{1}{4}$ inches.

Again—suppose a mast 81 feet, the square root is 9 inches.

Again—suppose a mast 60 feet, the root is 7·7.

Rule 2.—For *Lower Rigging*.—Divide the extreme length of the mast in feet by 9—the quotient is the size of the rope in inches.

For *Topmast and Topgallant Rigging*, the same rule is applicable as for lower rigging. Topmast to have three and topgallantmast two shrouds a-side.

For *Topmast Backstays*.—Divide the length of the topmast in feet by 6—the quotient is the size of rope in inches, for a pair on each side. Topmast, $40 \div 6 = 6\frac{2}{3}$ nearly.

Topgallant Backstays to be the same size as topmast rigging, one on each side; or divide the length of the mast by 5.

Royal Backstays to be the same size as topgallant rigging.

Royal Rigging, two-thirds of the backstays.

The Lanyard, half the size of its shroud.

TO MEASURE FOR LIFTS AND FOOTROPES.

OF LIFTS.

For the *Fore and Main Lifts*, measure from yardarm in Figure 1 to cap, and from cap half-way down the mast. These hook to eyebolts in yardarm hoops, reave through a block at cap, and come on deck with a luff tackle purchase. The crossjack lift generally hawls tight with a lanyard in the top.

Topsail Lifts.—Measure from yardarms to topmast-heads, above the rigging. These make fast with lashings to strop round the masthead, above the rigging, and hook on to the yardarms; or if gaining hoop on masthead (hounds hoop), hook lift to eye in it.

Topgallant Lifts.—Measure from yardarms to topgallant mastheads: these hook on yardarms, and make fast with a lashing round the mast above the rigging. Some people prefer them to reave through a thimble in topgallant rigging, and to come down and make fast to the crosstree.

Royal Lifts.—Measure from yardarm to eyes of royal rigging, and from eyes of rigging to topgallant masthead; allow enough to make fast. These reave through a thimble that is in a strop which lashes round the masthead above the rigging, that it may be taken on deck at pleasure.

OF FOOT ROPES.

Foot Ropes for the fore, main, and crossjack yards are in length the half of the extreme lengths of the yards that they go on. They splice round brace eyebolt at yardarm, and lash or seize on to truss.

Topsail, Topgallant, and Royal Footropes are in length three-fourths inside of yardarms of the length of the yards they go on. They splice round brace eyebolt, and come in past the centre of the yard abaft the mast.

and make fast one-third out on their opposite yard-arms.

Footropes of Jib and Flying Jib-booms are in length, the former 2 feet, the latter 1 foot, longer than their booms. They seize on to their guys, and make fast the flying jib footropes to the jib-guys, and the jib footropes to the cap or topmast stays.

The *Flemish Herse* is in length three times the length of the yardarm. These splice round eyebolt in the end of yard, and seize to the jackstay. The topsail yard is the only yard that they are now put on.

Stirrups on the lower yard, there are two; on the topsail and topgallant yards, one on each yardarm. Their length is three feet.

TO REAVE AND CUT RUNNING RIGGING.

The *Fore and Main Braces* should be double whips, with a leading block in board. I have used this with great advantage for both lower and topsail braces. A short goose neck iron bumpkin for the fore and foretopsail braces would be very convenient.

The *Fore and Maintopsail Braces* are rove with the same purchase; the standing part of the foretopsail brace made fast to the maintopmast head, and the maintopsail brace to the mizentopmast head. The standing and hawling parts of the whips come to the bumpkin end; sometimes the crossjack yard interferes with the maintopsail brace whip, in which case it must be brought to the mizen rigging dead-eyes.

The *Fore and Maintopgallant Braces* are single rope from yards to half-way down the lower masts, then whips are rove.

Royal Braces are altogether single.

The *Crossjack and Mizentopsail Braces* are double from yard, the former to top and the latter to cap of

mainmast and to deck. The topgallant and royal braces are single from yard to crosstrees and to deck.

Topsail Halyards are single chain before the mast to the yard and through sheave in mast, and runner and tackle abaft the mast. The runner comes to a small chain plate between the topmast backstay ones, and the tackle to another on the opposite side.

Topgallant Halyards are single chain from yard through sheave hole in mast and down to top, then a double Spanish burton, or three single whips, to be kept amidships.

Royal Halyards are single from yard through sheave in mast, and down to half-way between the top and deck, then a gun tackle purchase.

The following halyards are all single rope fast to the sail, and go with whips on deck:—Topmast staysails, jib, flying jib, lower studding sail, topmast and topgallant studding sails. The outhauls of the spanker, both head and foot, are the same purchase—jib, flying jib, and staysail sheets. The downhauls are all single rope.

Reef Tackles for the Courses are single rope from cringle in the leach of the sail to block on yardarm, led in across the yard to opposite yardarm through block and clench, or hook to reef cringle—a whip in the bight of this hawls both out at once.

Topsail Reef Tackles are single rope from leach of sail through block on yardarm down through a block on cap, and from top with a gun tackle purchase on deck.

Reef Gigs are single through block on yardarm down through block on top rim, and with whip on deck. These are very handy, and with them reefing can be performed with fewer hands in less time, thus—as soon as the yard is down, one hand lays up on each side and hooks the gig on to the reef cringle, then haul the sail out taught band on deck, pass the earings and come up the gig and unhook it, ready for the next reef.

Clue Garnets, Topsail and Topgallant Chelines, are all rove alike, viz.—through quarter block down to block in clue of the sail, and up and clinch to yard.

Buntlines of Courses have two legs on each side, the bight rove through a single block, and hauled up with gun tackle purchase.

Buntlines of Topsails and Topgallantsails are single rope coming on deck with whips; the topsail has two buntlines, the topgallantsail has one with two legs before the sail.

Topsail Sheets are single chain with rope tail.

Topgallant Sheets are chain from the sail through quarter block of topsail yards (when the yards are on the cap), and single rope from this to futtock rigging, and from futtock rigging a single whip on deck.

OF MASTS, CHEEKS, AND TRUSSELTREES.

LOWER Masts of Merchant Ships are generally made of yellow pine, in one piece. Masts made of several pieces are generally used in the Royal Navy, where it would be difficult to procure a single piece the size. These are termed *made masts*; and though they have long been held in high repute, they have not become general in the merchant service. Masts of one piece are very liable to rot; five or six years is about the average time they stand good. They generally begin to rot about the cheeks, trusseltrees, and heel. And this is generally supposed to be brought about by wet. This, however, is questionable, as the kind of wood the cheeks, trusseltrees, or step is made of has a great deal to do with the decay. It has been remarked that American red oak cheeks have ruined a mast in three years.

Captain Brown, of the barque *Sunda*, had his lower-masts made so that the masts formed their own cheeks—

the spar being large enough for that purpose. These were justly esteemed by many; and on this principle any mast may be made. All that is required is to find sufficient support for the topmast; and this may be done even without the aid of trusseltrees as now made, viz.—make an iron cap to fit the mast at the hounds, the mast increasing at the neck and the hoop with gaining sides; have a notch cut in aft part of lower-mast 4 feet above the hounds, and a like notch made in the fore part of heel of topmast 2 feet lower down; get a large shackle, to shackle, as I might say, the two masts together—this to have the entire weight of the topmast. The gaining hoop that goes on the mast-head to have the weight of the mainyard.

Iron Masts have been tried in several ships in Great Britain, but, in some instances, have not proved themselves worthy of estimation; they are, however, much approved of in Dutch ships, and are becoming general. The writer saw five large Dutch ships in Hartlepool in 1853, and all of them had one or more of their masts iron. The *Vert Rowen*, a ship of 700 tons, had her fore and mainmasts, bowsprit, and mainyard iron; and the captain of her told the writer that they were about the same weight as yellow pine, and equal or superior to it in every respect. He kept them well covered with paint, and he had no doubt but they would last a good many years. The rigging of these ships were all thicker rope than the usual size, and were kept well tight. That these masts have given way in some British ships, the writer thinks must have been owing to their rigging either having been too slack or too slight, and he thinks if wire rigging were their support that no fear need be entertained of their strength or duration. This rigging may be set up with patent chain plates, which would entirely do away with hemp rope for the support of the mast.

PROPORTIONS FOR THE LENGTHS AND DIAMETERS OF MASTS AND YARDS ADAPTED TO THE MERCHANT SERVICE.

In proportioning spars to a ship in the Merchant Service, no exact rule can be laid down to answer all kinds of build and different rigs. The following Rules are by Henry Cleaver Chapman, Esq. :—

The Means. {
 “ *Rule 1st.*—The length of the lower deck and midship inside breadth added together, the half is the length of the mainmast.
 “ *Rule 2nd.*—Multiply the inside midship beam by 5; the half will be the length of the mainmast.
 “ *Rule 3rd.*—To four times the inside midship beam add the depth and half-depth of the hold; the half will be the length of the mainmast—which being

determined, the other masts and yards are proportioned as follows :—

“ Foremast, 3 feet in ships under 400 tons, and 5 feet in ships over that measurement, shorter than the mainmast.

“ Mizenmast, 5-6ths of mainmast.

“ Mizenmast of barques, the length of foremast.

“ Maintopmast, 3-5ths of mainmast.

“ Foretopmast, 3-5ths of foremast.

“ Mizentopmast, 5-7ths of the maintopmast.

“ Topgallantmast, half of topmast.

“ Royalmasts, 2-3rds of topgallantmasts.

“ Skysailmast, half the length of royalmasts.

“ Bowsprit, 3-5ths of mainmast.*

“ Brigs' mainmasts, by Rule 1st. — To the length and breadth add the half-depth of hold; the half is the length of mainmast.”

* *The bowsprit ought not to be longer than to give an angle to foretopmast at masthead, of 40 deg.*

DIAMETERS OF MASTS.

All masts should be 1 inch in diameter to every 3 feet in length. The lower masts to be measured at the hounds, and the topmasts and topgallantmasts at the caps. The bowsprit to be the same diameter as mainmast.

LENGTH OF YARDS.

Main Yard to be twice the inside midship beam.

Maintopsail Yard, 3-4ths of the mainyard.

Maintopgallant Yard, 3-4ths of maintopsail yard.

Mainroyal Yard, 3-4ths of topgallant yard.

Fore Yard to be 3 feet shorter than the mainyard, 2-3rds of which is to be taken from the yardarms, leaving the spread of fore and main yards nearly the same, so that the maintopsail will set either fore or aft.

The *Foretopsail and Topgallant and Royal Yards* to bear the same proportion to the foreyard that the main ones do to the mainyard.

Crossjack Yard to be the same length as the maintopsail yard. Mizentopsail, topgallant, and royal yards to be proportioned as those on the mainmast.

The diameters of all yards to be 1 inch in the slings to every 4 feet in length.

LENGTH OF BOOMS.

Studdingsail Booms to be 2 feet longer than the half of the yard they go on.

Jib-Boom to be in length outside of cap one-half the extreme length of foretopsail yard, and to be the same diameter in cap as foretopmast.

Spanker Boom to be not more than 4 feet over taffrail; spanker gaff to be 2-3rds of boom; diameter of each to be 1 inch to every 5 feet—measured at the middle of each.

NEW RULE FOR LENGTH OF YARDS.

SINCE these rules have been laid down, ships are made much longer in proportion to their beam; to counteract this the following Rules are proposed:—

As the length of the masts is taken from the beam, the squareness of the yards ought to be taken from the length of the ship.

For a Brig or Barque, the extreme lengths of the fore and main yards to be the length of her keel.

For a Ship, the hounded lengths of the fore, main, and crossjack yards to be the length of her keel.

ON PLACING MASTS IN A SHIP.

SEVERAL naval constructors have laid down rules for fixing the places of the masts of ships. The following is quoted from Mr Cock:—

“To produce the position of a ship or barque’s masts, square up to the deck, from the rabbet of the stem, at the load-line, on which make a spot; in like manner square up to the deck, on the load-line, at the rabbet of the stern post; measure the length between the two spots, which divide into nineteen equal parts; let the centre of the foremast be at three-nineteenth parts, the aft-side of the spot squared up from the rabbet of the stern, and the centre of the mainmast at eleven-nineteenth parts the aft-side of the above spot, and the centre of the mizenmast at fifteen-nineteenths from the said spot. Should the vessel be a barque, in that case the centre of the mizenmast is only to be fourteen and a half times the aft-side.

“BRIGS’ MASTS.

“Set up on the deck two spots, from the rabbet of the stem to the rabbet of the stern post at the load-line, in

the manner already stated ; divide the space between into fifteen equal parts ; set aft from the squaring up of the rabbet of the stem two and a half of fifteen parts as the centre of the foremast, and from the same spot nine-fifteenth parts for the centre of the mainmast."

The following rules are from Edye :—

"18-GUN BRIG (382 TONS).—Mainmast, *abast* the centre of the load-water line, about one-seventh of the whole length. Foremast, *abast* the rabbet of the stem, about one-sixth of the whole length. Centre of effort of the sails, *afore* the centre of flotation, 2 ft. 4 in.

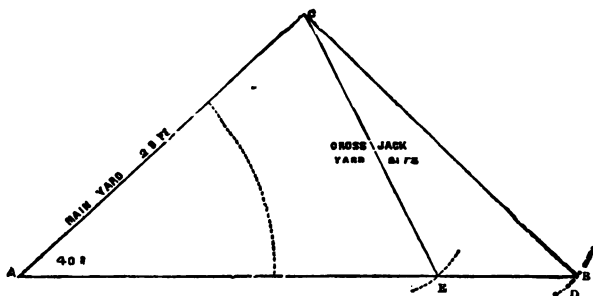
"10-GUN BRIG (235 TONS).—Mainmast, *abast* the centre of the load-water line, about one-seventh of the whole length. Foremast, *abast* the rabbet of the stem, about one-sixth of the whole length. Centre of effort of the sails, *afore* the centre of flotation, 3 ft. 3½ in.

"SCHOONER (183 TONS).—Mainmast, *abast* the centre of the load-water line, about one-eighth of the whole length. Foremast, *abast* the rabbet of the stem, about two-elevenths of the whole length. Centre of effort of the sails, *afore* the centre of flotation, 9 in.

"CUTTER (161 TONS).—Mainmast, *abast* the centre of the load-water line, about one-ninth of the whole length. Centre of effort of the sails *with* gaff-topsail, *abast* the centre of flotation, 4½ in. Centre of effort of the sails *without* gaff-topsail, *afore* the centre of flotation, 2 ft. 9½ in. [The situations thus stated, are in all cases set off on the load-water line.]"

Since these rules have been laid down, ships have in general been made much longer to their breadth, which may cause new rules to be made ; but as it is not intended here to enter into this, which more properly belongs to the naval constructor, I shall only make a remark or two to the shipmaster.

FIG. 6.—POSITIONS OF MASTS.



Have your masts sufficiently apart, and no more than will allow your yards to brace contrary ways without locking; this may be found very simply, thus—draw a base line, *A B*, on *A* describe an arc of 40° , and draw *AC* equal to half length of mainyard, from *C* with half length of fore and crossjack yards on your compasses, describe arcs cutting *AB* as at *D* and *E*. Now, from *D* to *A* is the distance your fore and main masts must be apart, presuming they brace forward 50° from their square, and from *E* to *A* is the distance of your main and mizen masts. Having determined these distances, the mainmast should be at least as far aft as the above rule advises.

It is a mistaken supposition that the foremast being placed far forward in the ship prevents her from gripping: indeed, it has the contrary effect, as it depresses the bow, and this causing more resistance forward to leeward, throws or rather pushes the bow to windward, and the helm being put hard up to check this, throws her right off before there is time to stop her. How very plainly this is seen when in a fresh wind the topmast and lower studdingsails are carried long.

NEW RULES FOR MASTING SHIPS.

Now that ships are built much longer and sharper than formerly, and more especially those with the auxiliary screw, it seems to the writer that an alteration in the rig and position of the masts is much wanted. The undermentioned plans are proposed, for the following reasons, viz. :—

To bring the centre of effort more in the centre of flotation.

To lighten the ship forward, and consequently to ease her in a seaway in pitching.

To be more easily handled, and with fewer men—with about half the compliment of a ship rigged in the usual way.

To add strength to the ship by spreading the rigging and masts.

To enable the ship to carry sail much longer with less danger.

And to be more easily unencumbered from top lumber at sea.

The ship to have four masts, the position and size of them as follows :—

TO FIND THE POSITION

Of the Main and Middlemasts, bisect the keel and mark it, and place the middlemast as far before and the mainmast as far by aft this mark as will allow their yards to brace contrary ways without locking.

For the Fore and Mizenmasts.—The foremast to be as far before the middlemast, and the mizenmast as far by aft the mainmast as will allow their yards to brace contrary ways without locking.

TO FIND THEIR LENGTHS.

The *Main and Middlemasts* alike, and to be above the upper deck 1 and 7-10ths the ship's extreme beam.

The *Fore and Mizenmasts* alike, and to be in length 5-6ths of the above.

Mastheads, 1-5th of their length above deck.

Topmasts, 3-4ths of their lowermasts above deck.

Topgallantmasts, half of their topmasts.

Royal masts, 2-3rds of their topgallantmasts.

LENGTH OF YARDS.

The *Lower Yards* to be the same length as their lowermasts above deck, or their hounded length equal to the length of keel.

Topsail Yards, 3-4ths of their lower yards.

Topgallant Yards, 3-4ths of their topsail yards.

Royal Yards, 3-4ths of their topgallant yards.

Bowsprit, 2-3rds of ship's beam outside of stemhead in ships whose length is six times her beam; in ships whose proportions are longer it may be considerably shortened. All that is required is proper support for the foretopmast, and could the foretopmast stay led into the head make an angle with its mast of 40°, the bowsprit may altogether be done away with.

Jib-boom outside of Cap, one-half length of mainyard.

Flying Jib-boom outside of its Cap, one-half of foretopsail yard.

Spanker Boom, same length as mizentopsail yard.

Spanker Gaff, 2-3rds of boom.

OF IRON WORK ATTACHED TO MASTS AND RIGGING.

OF HOOPS ON MASTS.

Heel Hoop is a plain hoop that goes on the foot of the mast to prevent it from splitting.

Rack Hoop is a hoop fitted round with belaying pins, *having on the after part a neck for support of trysail-*

mast, and spanker boom on mizenmasts of ships, and on foremasts of small vessels.

Stay Hoop goes on mainmasts of ships 10 feet above the deck for mizen stay to set up to, and sometimes on foremast for maintopmast stay. It is a plain hoop, screwed tight on mast with a screw bolt, in the centre of which a roller is put to set the stay up to.

Spider Hoop goes on about 8 feet in large ships, and 6 feet in small ones, below the hounds of the mast; it is fitted with eyes on each side, to which the futtock rigging is fastened, and screwed tight on the mast with a screw bolt: like the stay hoop it does not meet on the mast, but between the lugs for screw bolt a small goose neck or socket is put to support the tryail gaff, and if a trysailmast is there it receives the end of it.

The *Spider Hoop* ought to be made distinct from the truss hoop, it being very dangerous to have them both in one.

Truss Hoop for lower yard has a lug on each side to receive the legs of the bow of truss; it fastens to the mast as the spider hoop; the legs of the truss are fastened to it with screw bolts, which go into mast cheek 3 inches. (*See Truss.*)

Hounds Hoop.—This is a very strong hoop, thicker on the top than the bottom, decreasing in diameter towards upper part, making what is called a gaining hoop, a small chamfer being taken off the top of hounds, with a small rest to it; a strong eye is put in the centre of the fore part to hang lower yard to, and an eye in each side for pendants to hook to. Its greatest use is to bind chucks to masts, and to support trusseltree and lower yard.

Masthead Hoops are different in shape and number for each particular use or rig of ship. In cutters, schooners, and steamers, there are sometimes three and four hoops on masthead between the cap and rigging; these are generally plain hoops, with an eye in after part for throat and peak halyards. On mainmasts and

foremasts of large ships, a plain hoop, with roller in after part, is put on to set up mizen and maintopmast stays, and sometimes one immediately below the cap for topgallant stays, but oftener a roller is put into after part of cap for this purpose. The hoops for the topmast stays have a shackle attached to hook peak tie to; very generally the lower yards are hung to this hoop, but the best plan is to hang them to hounds hoop.

Futtock Hoop on Topmasts is made in two pieces, with screw bolt on each side, with rollers or otherwise for topgallant futtock rigging; that for the maintopmast should have an eye by aft the rollers for foretopgallant braces.

Hounds Hoop for Topmasthead to be the same as for lowermast, except the eyes should be on the forward part of each side for topsail lifts to hook to, and on each after corner for jib and staysail halyards.

OF YARD HOOPS.

Truss and Sling Hoop to be fitted with three eyes—one for slings, on after upper side; one for trusses, on after part; and other for quarter block, on lower part, for topsail sheets.

Yardarm Hoops have three eyes, and sometimes four eyes in them—one for lift, placed rather on after side of top to keep lift clear of topsail sheets; one on the after side for brace; one on the bottom for reef tackle; and sometimes one in upper part of fore side for earings to reave through.

Hoops for all Yards are alike; but instead of an eye on the after part of truss or tie hoops on the topsails and topgallant yards, a mouth or aperture is formed to receive a socket to attach it to the parrel on the mast. For mainyards of brigs and mizenyards of ships, the eyes for the braces are put on the fore part.

HOOPS ON BOWSPRIT.

Heel Hoop or Band, made to fit heel, with lugs to fasten down through deck and beam, with screw nut to secure heel of bowsprit.

Gammon Band to go over bowsprit, with legs to reach down to head knee, and fasten with bolts through head knee; or a better plan is to put an iron rider inside of night heads over bowsprit, to fasten to night heads with drift bolts.

Forestay Band to be made with an eye on each upper corner to take bull's-eyes for forestay, and fasten on top of bowsprit with lockings or screw bolt.

Inner Bobstay Bands to be made with an eye on each side for bowsprit shrouds to set up to, and screw tight on to the underneath part of bowsprit. The screw bolt to be made long enough to receive shackle to set bobstay up to; above the eyes for bowsprit shrouds, small eyes are put for fore bowline blocks.

Outer Bobstay Band to be made like the inner one; the eyes on each side to receive bull's-eye for topmast stays. Very often these are rove through bees on bowsprit, in which case the bees reach from outer to inner bobstay band, and are drawn by them tight on to bowsprit.

BOOM IRONS

For Jib-boom and Flying Jib-boom Ends have an eye underneath for martingale stay, and one on each side for guys. Martingale end, spanker-boom end, gaff-ends, &c., have a hoop with three eyes for stay, back-ropes, ties, vangs, &c. &c.

Of Studdingsail Boom Irons.—These for large ships, and indeed small ones too, ought to have them for the lower yards under the yard on the after side, as they are easier got out and in here than on top, and out of the way in furling or reefing.

OF TRUSSES.

The bow of the trusses of the lower yards ought to go out from the mast, and the swivel be as near the yard as possible: this keeps the yard always amidships, and makes it easier to brace round, and less strain on the slings.

OF SLINGS.

Slings of the lower yards ought to make fast to hounds hoop.

OF TRUSS PARRELS.

The parrels of the topsail, topgallant, and royal yards ought to be made of iron. These save a great deal of chafe, are lighter, and keep the yard clear of the rigging in lowering or hoisting; the neck, however, must not be made too long, as it throws the yard to leeward when braced up.

OF TRUSSELTREES.

Trusseltrees ought to be not more than 1 inch before the heel of the topmast or topgallantmast—a strong iron band, forming the fore part of them, covered with a narrow top rim; no eye nor fastening bolts ought to be put in the fore part of them, nor through their centre: bind them together with hoops.

OF TOPS.

Tops ought to be cut away in the fore part as much as possible, the foremast crosstree having a little curve aft, bringing its ends abreast of centre of lower mast, and shorter than the other two. The after crosstree ought to be a very little shorter than the span of the topmast backstays there.

OF TOPMAST CROSSTREES AND TRUSSELTREES.

The same rule for these trusseltrees as for the lower ones, and likewise for the crosstrees, the length of which ought to be something more than the spread of

the backstays there. A crosstree or outrigger for the backstays from the foremast crosstree, just clear of the topmast rigging, out aft, over the after crosstree about 3 feet, or far enough to keep the backstay 8 or 10 inches outside of the aftermost shroud of top-gallant rigging—is very beneficial.

OF CAPS.

All caps ought to be made of iron—being stronger, lighter, neater, and more durable than wood ones and iron stropped.

OF CAT-HEADS.

These should be made with one sheave in their outer end, or with a snatch or a thumb-cleat put on the after side of them with a good large sheave, and cat the anchor with the fish-hook and tackle: this is a better purchase, and is easier hooked on the anchor. Let the fish pendant come from the topmast head with a runner and tackle. On the end have two blocks for fore tack and preventer tack.

OF SWINGING BOOMS.

These are the heaviest part of setting studdingsails; they may, however, be made much lighter, with very little loss to the sail, viz.—put the goose neck into the windlass range bits, have the boom in board, and ship and unship it at pleasure—the rail will support it; and it may be made fast to the rail, which will do away with top-inlifts, fore-guys, and indeed after-guys, if the outhaul is passed aft.

OF BOOM IRONS.

To go through the yardarm and fasten with screw nut—the neck of the topsail yard ones to be at least 2 inches long, to allow the jewel block of topmast studdingsail halyards to hook on to.

OF PUMPS.

Pumps should be worked with a handle like a winch, with a fly-wheel attached.

OF WINDLASS PURCHASE.

I have seen nothing better than Pow and Facus's Patent, as it is strong, and not likely to get out of order. Windlasses may be considerably shortened without ends and patent whelps. Ships over 400 tons to have four levers or handles.

OF CHESTREES.

These ought to be double, one for the main tack, and the other for the tack tackle; the main and fore sheet sheaves ought to be just far enough aft to spread the foot of the sail tight, and no more. There ought to be two sheaves, one for the sheet, and the other for the preventer. If the chestrees are single, a good eyebolt ought to be put into the water-ways for the tack tackle.

OF SPRITSAIL YARD.

These, now, are justly condemned, and whiskers from night-heads, through an iron on cat-head, substituted. If the guy makes an angle with the jib-boom of 12° , an outrigger is superfluous—the breadth of the bow giving spread enough for good support.

OF TRYSAIL MASTS.

Trysail masts should in all cases be used when the sail is bent—the jackstay in common use being both dangerous and unhandy.

MEASUREMENTS OF HULL AND SPARS TO DETERMINE LENGTH OF RIGGING.

| | Ft. | In. |
|---|-----|-----|
| 1. Length of ship from stemhead to taffrail, - - - | 143 | 0 |
| 2. " from stem to centre of partners of foremast, - - | 28 | 6 |
| 3. " " " " mainmast, - - - | 82 | 0 |
| 4. " " " " mizenmast, - - - | 116 | 0 |
| 5. " from deck to dead-eyes of lower rigging, - - | 4 | 0 |
| 6. " of bowsprit—diameter 2 feet, - - - | 34 | 0 |
| 7. " bowsprit bitts to stemhead, - - - | 12 | 0 |
| 8. Steeve of bowsprit, - - - 20 degrees. | | |
| 9. Length of bowsprit, - - - | 34 | 0 |
| 10. " of jib-boom, - - - | 47 | 0 |
| 11. " of flying jib-boom (deducting pole, 3 feet), - - | 35 | 0 |
| 12. " from a line across the deck from dead-eye to dead-eye— to step of foremast—mast perpendicular, - - | 23 | 6 |
| 13. " of foremast from heel to hounds, - - - | 54 | 0 |
| 14. Diameter of mast at hounds, - - - | 4 | 6 |
| 15. Depth of trusseltrees, - - - | 1 | 2 |
| 16. " crosstrees, - - - | 0 | 5 |
| 17. Length of masthead, - - - | 12 | 0 |
| 18. " of topmast from bottom of fid hole to hounds, - - | 34 | 0 |
| 19. " of masthead, - - - | 5 | 0 |
| 20. Depth of trusseltrees, - - - | 1 | 0 |
| 21. " crosstrees, - - - | 0 | 4 |
| 22. Length of topgallantmast from bottom of fid hole to hounds, - | 20 | 0 |
| 23. " of royalmast, - - - | 15 | 0 |

NOTE.

No. 12 is taken thus: stretch a line across the deck from dead-eye to dead-eye over the partners of the mast, and drop a plumb-line to step.

No. 24 to 28—at this line raise a tub (bottom up), or any convenient broad plank, and describe an arc of the same diameter of mast above hounds, where the rigging goes, and measure from the nearest part of this arc to each dead-eye, beginning at the foremast, which call first, second, and so on for all the dead-eyes of the lower rigging. For the topmast backstays, reduce your arc to the size of the topmast at head; and likewise for topgallantmast.

No. 33 is obtained by placing a board over hole for topmast, and describing an arc in the same way, and measuring to each dead-eye.

If your masts rake much in taking the No. 12 measurement (after the ship is put on even keel), let your plumb-line hang from the centre of partners, and measure from centre of step to plumb-line; divide this by the number of feet of depth from partners to step, and the quotient will be the rake per foot of mast, for which proceed as in page 9.

| | | | | | | | Ft. | In. |
|-----|------------------------|---|--|---|-------------|------|-----|------|
| 24. | Length | from the arc over partners of mast to 1st dead-eye, | - | | | | 13 | 0 |
| 25. | " | " | " | " | 2nd | " | - | 13 0 |
| 26. | " | " | " | " | 3rd | " | - | 13 8 |
| 27. | " | " | " | " | 4th | " | - | 15 0 |
| 28. | " | " | " | " | 5th | " | - | 16 8 |
| 29. | " | from arc above the partners to dead-eye of topmast | | | | | | |
| | | backstay dead-eye, | - | - | - | 1st, | 15 | 6 |
| 30. | " | " | " | " | " | 2nd, | 17 | 9 |
| 31. | " | " | " | " | topgallant, | " | 18 | 6 |
| 32. | " | " | " | " | royal | " | 19 | 3 |
| 33. | " | " | at hole of crossrees for topmast to dead-eye, 1st, | | | | 5 | 0 |
| 34. | " | " | " | " | " | 2nd, | 5 | 8 |
| 35. | " | " | " | " | " | 3rd, | 7 | 2 |
| 36. | " | " | topmast crossrees to hole in crossree, 1st, | | | | 4 | 0 |
| 37. | " | " | " | " | " | 2nd, | 5 | 6 |
| 38. | " | from truss hoop on mast to hounds, | - | - | - | - | 5 | 0 |
| 39. | " | from spider hoop | " | " | - | - | 7 | 0 |
| 40. | " | " | topmast to hounds, | - | - | - | 3 | 0 |
| 41. | " | of lower yard—(yardarm $2\frac{1}{2}$ feet), | - | - | - | - | 56 | 0 |
| 42. | " | of topsail yard—(yardarm $2\frac{1}{2}$ feet), | - | - | - | - | 42 | 0 |
| 43. | " | of topgallant yard—(yardarm $1\frac{1}{2}$ feet), | - | - | - | - | 31 | 6 |
| 44. | " | of royal yard—(yardarm 1 foot), | - | - | - | - | 24 | 0 |
| 45. | " | of trysail gaff, | - | - | - | - | 23 | 0 |
| | " | of martingale, | - | - | - | - | 15 | 0 |
| | " | of whiskers, | - | - | - | - | 20 | 0 |
| 55. | Depth of trusseltrees, | - | - | - | - | - | 1 | 0 |

MAINMAST.

| | | | | | | | | |
|-----|---|---------------|---|-----|---|---|----|---|
| 46. | Whole length of mast, | - | - | - | - | - | 72 | 0 |
| 47. | " | " | of masthead, | - | - | - | 13 | 0 |
| 48. | " | " | from heel to hounds, | - | - | - | 59 | 0 |
| 49. | " | " | from a line across from dead-eye to dead-eye to step, | | | | 23 | 0 |
| 50. | Diameter of hounds (24 inches circumference), | - | - | - | - | - | 6 | 0 |
| 51. | Depth of trusseltrees, | - | - | - | - | - | 1 | 3 |
| 52. | " | of crossrees, | - | - | - | - | 0 | 4 |
| 53. | Length of topmast from bottom of fid hole to hounds, | - | - | - | - | - | 34 | 0 |
| 54. | " | of masthead, | - | - | - | - | 5 | 0 |
| 56. | Depth of crossrees, | - | - | - | - | - | 0 | 4 |
| 57. | Length of topgallantmast from bottom of fid hole to hounds, | - | - | - | - | - | 20 | 0 |
| 58. | " | of royalmast, | - | - | - | - | 15 | 0 |
| 59. | From the arc over partners to 1st dead-eye, | - | - | - | - | - | 13 | 5 |
| 60. | " | " | " | 2nd | " | - | 13 | 5 |
| 61. | " | " | " | 3rd | " | - | 14 | 0 |
| 62. | " | " | " | 4th | " | - | 15 | 3 |
| | " | " | " | 5th | " | - | 17 | 0 |

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| | | | | | Ft. | In. |
|-----|--|------------|---|------|-----|-----|
| 64. | From the arc over partners to topmast backstay dead-eye, | 1st, | - | - | 16 | 1 |
| 65. | " " " | " | " | 2nd, | 18 | 2 |
| 66. | " " " | topgallant | " | - | 19 | 5 |
| 67. | " " " | royal | " | - | 20 | 10 |
| 68. | " " at hole of crosstrees for topmast to 1st dead-eye, | - | - | - | 5 | 6 |
| 69. | " " " " " | " | " | 2nd | 6 | 9 |
| 70. | " " " " " | " | " | 3rd | 8 | 0 |
| 71. | " " " topmast crosstrees for topgallantmast to crosstree end, | - | - | 1st, | 4 | 6 |
| 72. | " " " " " | " | " | 2nd, | 5 | 6 |
| 73. | Length from truss hoop on mast to hounds, | - | - | - | 5 | 0 |
| 74. | " from spider hoop " " | - | - | - | 7 | 0 |
| 75. | " " " topmast " " | - | - | - | 3 | 0 |
| 76. | " of main yard (twice the ship's beam, 29 ft.—yardarm 3 ft.), | - | - | - | 56 | 0 |
| 77. | " of topsail yard (3-4ths of main yard), | - | - | - | 43 | 0½ |
| 78. | " of topgallant yard 3-4ths of topsail yard), | - | - | - | 32 | 7½ |
| 79. | " of royal yard (3-4ths of topgallant yard), | - | - | - | 24 | 6 |
| 80. | " of tryrail gaff, | - | - | - | 20 | 0 |

MIZENMAST.

| | | | | | | | |
|------|--|---|---|---|---|----|---|
| 81. | From a line across the deck from dead-eye to step, | - | - | - | - | 23 | 1 |
| 82. | Length from heel to hounds (circumference of mast at hounds, 5 feet 3 inches), | - | - | - | - | 51 | 6 |
| 83. | " of masthead, | - | - | - | - | 10 | 0 |
| 84. | Depth of trusseltrees, | - | - | - | - | 1 | 0 |
| 85. | " of crosstrees, | - | - | - | - | 0 | 4 |
| 86. | Length of topmast from bottom of fid hole to hounds, | - | - | - | - | 23 | 6 |
| 87. | " " head, | - | - | - | - | 4 | 2 |
| 88. | Depth of trusseltrees, | - | - | - | - | 0 | 8 |
| 89. | " of crosstrees, | - | - | - | - | 0 | 4 |
| 90. | Length of topgallantmast from bottom of fid hole to hounds, | - | - | - | - | 16 | 0 |
| 91. | " of royalmast, | - | - | - | - | 12 | 0 |
| 92. | " from the arc over partners to 1st dead-eye, | - | - | - | - | 10 | 9 |
| 93. | " " " 2nd " " | - | - | - | - | 11 | 0 |
| 94. | " " " 3rd " " | - | - | - | - | 12 | 2 |
| 95. | " " " 4th " " | - | - | - | - | 15 | 0 |
| 96. | " " " topmast backstay dead-eye, | - | - | - | - | 16 | 0 |
| 97. | " " " topgallant " " | - | - | - | - | 17 | 2 |
| 98. | " " " royal " " | - | - | - | - | 18 | 0 |
| 99. | " " " at crosstrees to dead-eye, 1st, | - | - | - | - | 3 | 2 |
| 100. | " " " " 2nd, | - | - | - | - | 3 | 8 |
| 101. | " " " " 3rd, | - | - | - | - | 4 | 0 |
| 102. | " " " topmast crosstrees to dead-eye, 1st, | - | - | - | - | 2 | 0 |
| 103. | " " " " 2nd, | - | - | - | - | 2 | 0 |

SHROUDS OF FORE RIGGING.

| | LENGTH. | | SIZE. | WEIGHT. | | |
|----------------------------|---------|-----|-------|---------|------|-----|
| | Ft. | In. | | Cwt. | qrs. | lb. |
| Starboard, 1st shroud, - | 46 | 0 | 8 | 1 | 0 | 1 |
| Port, 1st do. - | 46 | 6 | 8 | 1 | 0 | 2 |
| Starboard, 2nd and 3rd do. | 75 | 8 | 8 | 1 | 2 | 18 |
| Port, do. do. | 76 | 2 | 8 | 1 | 2 | 19 |
| Starboard, 4th and 5th do. | 78 | 6 | 8 | 1 | 2 | 24 |
| Port, do. do. | 79 | 0 | 8 | 1 | 2 | 25 |
| Weight of shrouds, - | - | - | - | 8 | 3 | 5 |

TOPMAST RIGGING.

| | | | | | | |
|------------------------------|----|---|-----------------|---|---|----|
| Starboard, 1st shroud, - | 37 | 0 | 5 $\frac{1}{2}$ | 0 | 1 | 15 |
| Port, 1st do. - | 37 | 9 | 5 $\frac{1}{2}$ | 0 | 1 | 15 |
| Starboard, 2nd and 3rd do. | 75 | 4 | 5 $\frac{1}{2}$ | 0 | 3 | 3 |
| Port, do. do. | 75 | 8 | 5 $\frac{1}{2}$ | 0 | 3 | 3 |
| Weight of topmast rigging, - | - | - | - | 2 | 1 | 8 |

TOPGALLANT RIGGING.

| | | | | | | |
|---------------------------------|----|---|-----------------|---|---|----|
| Starboard side, - - | 54 | 5 | 3 $\frac{1}{2}$ | 0 | 0 | 24 |
| Port do. - - | 54 | 5 | 3 $\frac{1}{2}$ | 0 | 0 | 24 |
| Weight of topgallant rigging, - | - | - | - | 0 | 1 | 20 |

ROYAL RIGGING.

| | | | | | | |
|----------------------------|----|---|-----------------|---|---|----|
| Starboard side, - - | 36 | 2 | 2 $\frac{3}{4}$ | 0 | 0 | 10 |
| Port do. - - | 36 | 2 | 2 $\frac{3}{4}$ | 0 | 0 | 10 |
| Weight of royal rigging, - | - | - | - | 0 | 0 | 20 |

FORE TOPMAST BACKSTAYS.

| | | | | | | |
|--------------------------------|-----|---|---|---|---|----|
| Starboard side, - - | 143 | 3 | 7 | 2 | 1 | 14 |
| Port do. - - | 143 | 9 | 7 | 2 | 1 | 15 |
| Weight of topmast backstays, - | - | - | - | 4 | 3 | 1 |

TOPGALLANT BACKSTAYS.

| | | | | LENGTH. | | SIZE. | WEIGHT. | | |
|-----------------|---|---|--|---------|-----|-----------------|---------|------|-----|
| | | | | Ft. | In. | In. | Cwt. | qrs. | lb. |
| Starboard side, | - | - | | 91 | 6 | 4 $\frac{1}{2}$ | 0 | 2 | 14 |
| Port do. | - | - | | 91 | 6 | 4 $\frac{1}{2}$ | 0 | 2 | 14 |

Weight of topgallant backstays, - 1 1 0

ROYAL BACKSTAYS.

| | | | | | | | | | |
|-----------------|---|---|--|-----|---|-----------------|---|---|----|
| Starboard side, | - | - | | 106 | 0 | 3 $\frac{1}{2}$ | 0 | 1 | 22 |
| Port do. | - | - | | 106 | 0 | 3 $\frac{1}{2}$ | 0 | 1 | 22 |

Weight of royal backstays, - - 0 3 16

| | | | | | | | | | |
|------------------|---|---|---|-----|---|---|---|---|----|
| JIB GUYS, | - | - | - | 130 | 0 | 6 | 1 | 2 | 12 |
| FLYING JIB GUYS, | - | - | - | 152 | 4 | 0 | 0 | 3 | 10 |
| BACKROPES, | - | - | - | 50 | 0 | 5 | 0 | 2 | 0 |
| | | | | | | | 2 | 3 | 22 |

Total weight of stays and standing fore rigging, 40 0 15

SHROUDS OF MAIN RIGGING.

| | | | | | | | | |
|----------------------------|---|--|----|------------------|---|---|---|----|
| Starboard, 1st shroud, | - | | 51 | 0 | 8 | 1 | 0 | 13 |
| Port, 1st do. | - | | 51 | 3 | 8 | 1 | 0 | 13 |
| Starboard, 2nd and 3rd do. | | | 86 | 5 $\frac{1}{2}$ | 8 | 1 | 3 | 17 |
| Port, do. do. | | | 86 | 11 $\frac{1}{2}$ | 8 | 1 | 3 | 20 |
| Starboard, 4th and 5th do. | | | 89 | 1 | 8 | 1 | 3 | 26 |
| Port, do. do. | | | 89 | 7 | 8 | 1 | 3 | 27 |

Weight of main shrouds, - - 10 0 4

TOPMAST RIGGING.

| | | | | | | | | |
|----------------------------|---|--|----|---|-----------------|---|---|----|
| Starboard, 1st shroud, | - | | 37 | 9 | 5 $\frac{1}{2}$ | 0 | 1 | 15 |
| Port, 1st do. | - | | 39 | 9 | 5 $\frac{1}{2}$ | 0 | 1 | 15 |
| Starboard, 2nd and 3rd do. | | | 75 | 4 | 5 $\frac{1}{2}$ | 0 | 3 | 3 |

ON RIGGING.

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| | LENGTH. | | | SIZE. | WEIGHT. | | |
|------------------------------|---------|-----|---|-------|---------|------|-----|
| | Ft. | In. | | In. | Cwt. | qrs. | lb. |
| Port, 2nd and 3rd shroud, | 75 | 8 | | 5½ | 0 | 3 | 8 |
| Weight of topmast rigging, - | | | - | | 2 | 1 | 8 |

TOPGALLANT RIGGING.

| | | | | | | | |
|---------------------------------|----|---|---|----|---|---|----|
| Starboard shrouds, - | 54 | 5 | | 3½ | 0 | 0 | 24 |
| Port do. - | 54 | 5 | | 3½ | 0 | 0 | 24 |
| Weight of topgallant rigging, - | | | - | | 0 | 1 | 20 |

ROYAL RIGGING.

| | | | | | | | |
|----------------------------|----|---|---|----|---|---|----|
| Starboard shroud, - | 36 | 2 | | 2¾ | 0 | 0 | 10 |
| Port do. - | 36 | 2 | | 2¾ | 0 | 0 | 10 |
| Weight of royal rigging, - | | | - | | 0 | 0 | 20 |

TOPMAST BACKSTAYS.

| | | | | | | | |
|--------------------------------|-----|----|---|---|---|---|----|
| Starboard pair, - | 153 | 4 | | 7 | 2 | 2 | 8 |
| Port do. - | 153 | 10 | | 7 | 2 | 2 | 9 |
| Weight of topmast backstays, - | | | - | | 5 | 0 | 17 |

TOPGALLANT BACKSTAYS.

| | | | | | | | |
|-----------------------------------|----|---|---|----|---|---|----|
| Starboard one, - | 96 | 5 | | 4½ | 0 | 2 | 12 |
| Port do. - | 96 | 5 | | 4½ | 0 | 2 | 12 |
| Weight of topgallant backstays, - | | | - | | 1 | 0 | 24 |

ROYAL BACKSTAYS.

| | | | | | | | |
|------------------------------|-----|----|---|----|---|---|----|
| Starboard one, - | 110 | 10 | | 3½ | 0 | 1 | 24 |
| Port do. - | 110 | 10 | | 3½ | 0 | 1 | 24 |
| Weight of royal backstays, - | | | - | | 0 | 3 | 20 |

Total weight of main rigging, - - - 20 1 1

SHROUDS OF MIZEN RIGGING.

| | LENGTH. | | SIZE. | WEIGHT. | | |
|-------------------------------|---------|-----|-------|---------|------|-----|
| | Ft. | In. | | Cwt. | qrs. | lb. |
| Starboard, 1st and 2d shroud, | 68 | 6 | 7 | 1 | 0 | 16 |
| Port, do. do. | 69 | 0 | 7 | 1 | 0 | 17 |
| Starboard, 3rd and 4th do. | 71 | 9 | 7 | 1 | 0 | 22 |
| Port, do. do. | 72 | 3 | 7 | 1 | 0 | 24 |

Weight of mizen rigging, - - 4 3 5

MIZEN TOPMAST RIGGING.

| | | | | | | |
|----------------------------|----|----|-----------------|---|---|----|
| Starboard, 1st shroud, - | 26 | 4 | 4 $\frac{3}{4}$ | 0 | 0 | 23 |
| Port, 1st do. - | 26 | 4 | 4 $\frac{3}{4}$ | 0 | 0 | 23 |
| Starboard, 2nd and 3rd do. | 51 | 10 | 4 $\frac{3}{4}$ | 0 | 1 | 18 |
| Port, do. do. | 52 | 3 | 4 $\frac{3}{4}$ | 0 | 1 | 19 |

Weight of mizen topmast rigging, - 1 0 27

MIZEN TOPGALLANT RIGGING.

| | | | | | | |
|---------------------|----|---|-----------------|---|---|----|
| Starboard side, - - | 50 | 6 | 2 $\frac{3}{4}$ | 0 | 0 | 15 |
| Port do. - - | 50 | 6 | 2 $\frac{3}{4}$ | 0 | 0 | 15 |

Weight of mizen topgallant rigging, 0 1 2

MIZEN ROYAL RIGGING.

| | | | | | | |
|---------------------|----|---|---|---|---|---|
| Starboard side, - - | 37 | 6 | 2 | 0 | 0 | 5 |
| Port do. - - | 37 | 6 | 2 | 0 | 0 | 5 |

Weight of mizen royal rigging, - 0 0 10

TOPMAST BACKSTAYS.*

| | | | | | | |
|--------------------|----|---|---|---|---|---|
| Starboard one, - - | 58 | 6 | 7 | 1 | 0 | 0 |
| Port do. - - | 58 | 9 | 7 | 1 | 0 | 0 |

Weight of topmast backstays, - - 2 0 0

* This backstay is single, and goes over the masthead with an eye splice.
 All the topgallant and royal backstays do the same—the usual way, with a horse shoe, being very sore upon the rope.

TOPGALLANT BACKSTAYS.

| | | | | LENGTH. | | SIZE. In. | WEIGHT. | | |
|-----------------------------------|---|---|--|---------|-----|--------------|---------|------|-----|
| | | | | Ft. | In. | | Cwt. | qrs. | lb. |
| Starboard one, | - | - | | 76 | 6 | 4 | 0 | 1 | 19 |
| Port do. | - | - | | 76 | 6 | 4 | 0 | 1 | 19 |
| Weight of topgallant backstays, - | | | | | | | 0 | 3 | 10 |

ROYAL BACKSTAYS.

| | | | | | | | | | |
|--|---|---|--|----|---|-----------------|----|---|----|
| Starboard one, | - | - | | 88 | 6 | 2 $\frac{3}{4}$ | 0 | 0 | 26 |
| Port do. | - | - | | 88 | 6 | 2 $\frac{3}{4}$ | 0 | 0 | 26 |
| Weight of royal backstays, - | | | | | | | 0 | 1 | 24 |
| <i>Total weight of shrouds of mizen rigging,</i> - | | | | | | | 9 | 2 | 22 |
| <i>Total Weight of Standing Rigging,</i> - | | | | | | | 70 | 0 | 10 |

END OF PART I.

PART II.
ON SAILMAKING.

PART II.

GENERAL REMARKS ON SAILMAKING.

It is recommended that every sail before it is cut should be projected on paper, and the gores and roaches* all calculated and marked on the plan.

ON SQUARE SAILS.

Allow 1 inch per foot for stretching in the drop, but nothing athwart, as good canvass will not stretch across. In angular cut sails, such as jibs and staysails on the luff, and mizens on the foot stretch, allowance must be made for them; and the usual allowance made (and which answers the purpose) is 1-12th the length of the luff of jibs and staysails, that is 1 inch per foot; and for the foot and head of mizens allow 1 foot in 16 of the length of the boom or gaff; always allow this when the sail is measured for, by holding the measuring line down on the stay for jibs, and in on the boom and gaff for mizens; but if either the head or the foot of mizens be without roach, measure to the exact size. It is only on long gores or long roaches that allowance has to be made across the canvass. Bad canvass, however, will stretch, and for it no allowance can be made: sails made of it will get out of shape, wear badly, and are very unprofitable. In choosing canvass prefer that of a known reputable maker: see that it is stamped with number, length, weight, and name of maker. The different numbers ought to weigh—per

* *Roach* in these remarks means that which is lengthened, and *Gore* that which is made broader.

in them (including courses and top sails), the stout rope should be carried round the clue, tack, or head, and spliced into the small rope, and cringles put in for the earing. The size of rope for leach and foot ropes of courses and topsails, for clue ropes of jibs and mizens, should be about 1 inch in circumference for each bolt of canvass contained in the body of the sail; for other sails, 3-4th inch rope per bolt is sufficient. The luff ropes of jibs and mizens, 3-4th inch per bolt; after leach ropes, 2-3rds of luff ropes; and foot ropes, 2-3rds of after leach ropes. If the head of the mizen hauls up and down, take the luff rope right up, and round to the after leach; if it bends to the gaff, one-half the size is sufficient. Sails should not be roped too slack, as many sailors are apt to do; in courses and topsails, &c., the canvass should be hauled well into the lay of the rope: this takes in sufficient slack if the rope has been stretched. Where the foot rope is served, marle the canvass on to it, leaving 1 inch per foot slack. The luffs of jibs and mizens are roped the same as the leach of the topsails: on the after leaches the rope and canvass should be alike tight; on the foot the canvass should be tighter than the rope, and sewn on, taking a very small hold of the canvass.

DIRECTIONS TO MEASURE AND CUT SAILS.

OF COURSES.

THE FORESAIL being square requires no remarks.

FOR MAINSAIL OR CROSSJACK.

Measure from centre of yard as far down the mast as you wish the foot of the sail to reach to, and from centre of yard to 1 foot inside of topsail sheet sheave-

hole, and from centre of yard to chestree, from which take 4 feet.

1st measurement, depth of centre of sail, - - 25 ft.

2nd ,, breadth of sail on yard, - - 24 „

3rd ,, from yard to chestree 44 ft.—less 4=40 „

With the first and second measurements project a figure, as $A B C D$, which call the square of the sail; then diagonally through this figure draw a line, $A F$, equal to your third measurement. Extend your line $B D$ to E , and $C D$ to D . Now, from E to D is your foot roach, and from F to E is your leach gore.

FIG. 7 (A).

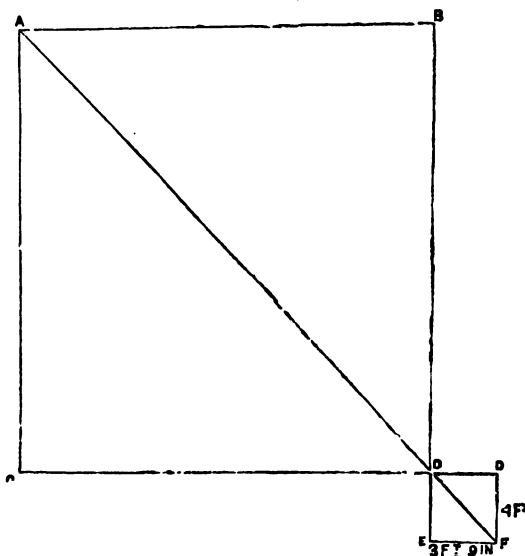
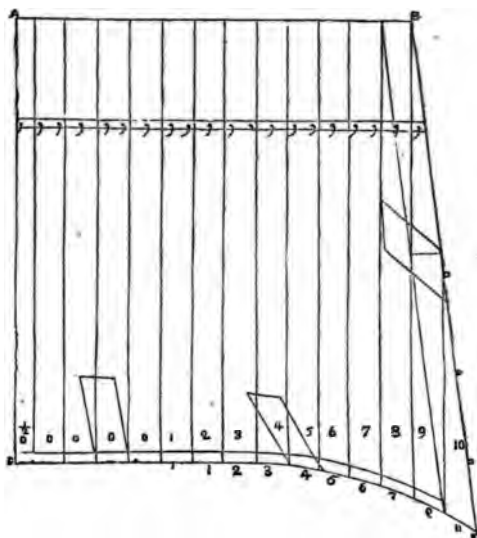


FIG. 7 (A).



To Project for Cutting.—Find the number of cloths in the head of the sail, thus:—Divide the head, AB , by the breadth of the canvass, less 1 inch, which leave for seam. Suppose the canvass to be 24 inches wide, this will give you for a divisor 23 inches. Breadth of sail, AB , 24 feet = 288 inches \div 23—gives 12 cloths, and 12 inches of another cloth; add 3 inches for tabling, and cut 12 cloths 15 inches: this will give you $12\frac{1}{2}$ cloths in each side of your sail. Divide AB into $12\frac{1}{2}$ parts, leaving the half in the centre, as in Figure 7 (B); join BF with a straight line, and CF with a roach; with a pair of parallel rulers at each division on AB , draw lines to CF parallel to CA .

To find the Leach Gore.—From E to F is 3 feet 9 in., or 45 inches, equal to 2 cloths; the distance from E

to E is 29 feet, which gives 14 feet 6 inches to each gore, or from B to F is nearly 30 feet, the half of which, 15 feet, measured across the canvass and cut by.*

To find the Roach—leaving $4\frac{1}{2}$ cloths in the centre square, therefore you have 10 cloths to roach—try thus (always increasing the roach as you go towards the clue) whole roach 49 inches :—

| | | |
|-----------|-------------|--------|
| 1 | 1 | 1 |
| 2 | 1 | 1 |
| 3 | 2 | 2 |
| 4 | 3 | 3 |
| 5 | 4 | 4 |
| 6 | 5 | 5 |
| 7 | 6 | 6 |
| 8 | 8 | 7 |
| 9 | 10 | 9 |
| 10 | | 11 |
| — | — | — |
| 55 | 40 | 49 |
| Too much. | Too little. | Right. |

To Cut the Canvass for this Sail.—To the depth A C add 8 inches for tablings, and cut it square at both head and foot. Cut all the square cloths you wish to put into the sail from this one, and mark them No. 0. [In this sail I have put 4 cloths on each side of the midship cloth square.] With this same length measure for the first roaching cloth, marking the selvage, run across the canvass by a thread, and measure down 1 inch, and there mark the selvage, cut right across from mark to mark; turn this cloth on your canvass and measure another the same. Mark these No. 1. As the next cloth has the same roach, measure and cut them alike, and mark them No. 2. With the longest selvage of No. 2, measure down the canvass and mark

* The roach of all square sails must increase as they go towards the clues. The arrangements on deck will guide you as to the number of square cloths in the centre of the courses. For a deck house you will require more, and for a flush ship fewer.

the selvage, run across the canvass by a thread, measure down 2 inches, mark the selvage and cut from mark to mark; turn the last cut cloth on the canvass, and cut another the same, which mark No. 3. Continue measuring in this way until you have got your 8 pairs cut and marked: each pair leaves your canvass square cut.

To Measure for the Gores.—Measure down on one selvage of the canvass 8 inches, and cut from this to the opposite corner, which makes the roach on your 9th cloth. From the shortest selvage of this, measure up the longest selvage of No. 8, and mark it; run across by a thread and measure back on your cloth 14 feet 6 inches; or measure with a line from the mark down to the opposite selvage 15 feet, and cut by this line, and mark it No. 9. Turn your canvass and measure with the longest selvage of your canvass (allowed for creasing), along down the shortest selvage of No. 8, and mark it; run across by a thread, measure downwards 11 inches for roach, mark it and cut from mark to mark. This makes No. 10. Then for the opposite side, your canvass is cut, roaching 11 inches. Measure off 2 inches on the longest selvage, and cut to nothing towards the opposite side; then on the shortest selvage of this, measure up on the longest selvage of No. 8, and proceed as before, or take duplicates of the first cut side.

Linings are put on the fore part of the sail, one cloth on the leaches, and half a cloth across the foot.

Buntline Cloths are 5 feet long, angling in towards the centre of the sail.

Leachline Cloths are 5 feet long, angling from leach towards the head, as in figure.

Reef Band is 1-3rd of a cloth broad, goes straight across the sail: the reef is put about 6 feet from the head; it goes, likewise, on the fore part of the sail.

Three points are put into every 2 cloths.

Ropes.—The head rope should be $1\frac{1}{2}$ inches; leach and foot rope, $4\frac{1}{4}$ inches. The leach rope should go

round the head about 2 feet, and cringle put in for earings. The best clues I have seen are rings, 6 inches diameter, of inch iron, with two thimbles in them for the leach rope and foot rope to splice into.

Cringles should be made of the same rope as the leach rope, served, and without thimbles.

TOPSAIL.

Measure from sheave hole in topmast to main yard, from which take 2 feet, or 1 inch per foot, and note the position of main cap and main stay. Measure from centre of lower yard to sheave hole, and from centre of topsail yard to hounds hoop for lift, less 2 feet. These measurements stand thus:—From sheave hole in topmast to lower yard, 37 feet, less 2 feet, = 35 feet; cap, from sheave, 20 feet; stay, from lower yard, 3 feet 9 inches; from centre of lower yard to sheave hole, 24 feet 6 inches; from centre of topsail yard to hounds hoop, 18 feet 6 inches, less 2 feet, = 16 feet 6 inches. Project the figure. On a base line, representing the lower yard, raise a perpendicular the height of the mast, less the 2 feet, as above. At this height, and parallel with the base line, lay off a line the length of the topsail yard, and mark it 2 feet in towards the perpendicular, or wherever you wish the head earing to reach to, and join this to clue at main yardarm. Then at 3 feet above the cap, measure if the length of the topsail yard will spread the sail—if it will, proceed as in the mainsail, finding the leach gore in the same way, and likewise the foot roach. If the topsail yard will not spread the sail, as in the present case, the leach of the sail must have an irregular gore—namely, long gores at the head, and shorter ones at the foot of the sail, the lengths of which must be found from the plan, as no rule can be laid down, always bearing in mind that the whole of the gores must not exceed the length of the leach. To illustrate this, suppose $A B$, 35 feet; $B C$, 24 feet 6 inches; $A D$, 16 feet 6 inches; $A E$, 12

whole sail. Measure the leach gores from plan, and calculate the foot roach as for the mainsail. Measure and cut as directed for the mainsail until you get to the 9th cloth from the centre, then

For the 9th Cloth, having the canvass left square, measure down one selvage 5 inches for roach, which cut, on the short selvage of this, measure up the longest selvage of No. 8 and mark it, then measure back again 4 feet 6 inches, run across by a thread and mark the selvage; at the first mark cut across the canvass 18 inches, from this cut down to second mark, turn the canvass and bring it down over this cut cloth and measure another of the same, and cut for the other side.

For the 10th Cloth, having the canvass left with 5 inches roach; increase it one inch, and from this short selvage measure up the shortest selvage of the last cut cloth, and mark it. Measure down again towards the foot 13 feet 4 inches, run across by a thread and mark it at 1 inch from the selvage, which is left for creasing. Stretch a piece of tarred twine from upper mark down to the lower mark, and cut. Turn the canvass and cut another the same for the other side.

For the 11th Cloth, your canvass having a 6-inch roach, increase it 1 inch, and, on this short selvage, creased, measure up the shortest selvage of the 10th, being creased, and mark. Measure back again towards the foot 7 feet 7 inches, run across by a thread to the opposite selvage, and mark it. Cut from mark to mark, turn the canvass, and cut another the same for the other side.

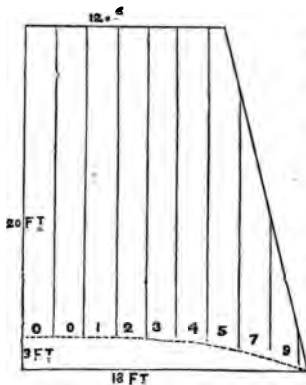
For the 12th Cloth, increase the roach on the canvass 1 inch, measure this short selvage up the shortest selvage of No. 11, creased, and mark it. Measure back 5 feet 8 inches, run across by a thread and mark it, and cut from mark to mark, turn the canvass, and cut another the same.

For the 13th Cloth, increase the roach 1 inch, mea-

sure up the shortest selvage of No. 12, being creased, mark it, and cut from mark down to point. Cut one the same for the other side.

TOPGALLANTSAIL.

FIG. 9—TOPGALLANTSAIL.

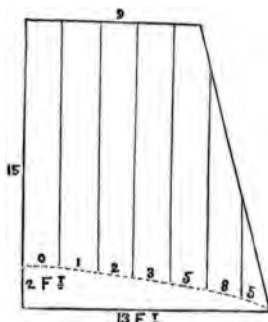


Measure from sheave hole in topgallantmast to 1 foot below sheave hole in topmast, and note position of topmast stay for roach. Measure from centre of topgallant yard to hounds hoop, less 1 foot, and from centre of topsail yard to sheave hole. The measurement of mast is 20 feet; topgallant yard, 13 feet 6 inches, less 1 foot, is 12 feet 6 inches; topsail

yard, 18 feet; roach, 3 feet.

Find the number of cloths in the head, the leach gores and the foot roach as in the mainsail, and measure and cut as directed for topsail. It is customary with some sailmakers, in cutting the gores of a topgallant sail, to cut them irregular, having the longest gores at the bottom or clue of the sail, and shorter ones above: this is done to make the sail set with a straight leach, to take away that bend inwards. This of course is according to fancy, and must be allowed for by the judgement of the cutter, bearing in mind that the gores must not be longer than the leach of the sail.

FIG. 9—ROYALSAIL.

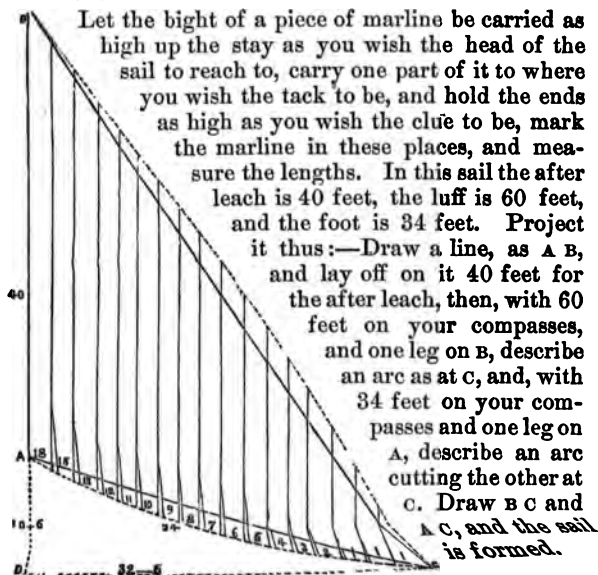


ROYAL.

Measure from sheave hole of royalmast to 1 foot below sheave of topgallantmast; from centre of royal yard to as far as you desire the earing to go to; and from centre of topgallant yard to sheave hole. Measurements here as per figure.

JIB OR STAYSAIL.

FIG. 10—JIB.



Let the bight of a piece of marline be carried as high up the stay as you wish the head of the sail to reach to, carry one part of it to where you wish the tack to be, and hold the ends as high as you wish the clue to be, mark the marline in these places, and measure the lengths. In this sail the after leach is 40 feet, the luff is 60 feet, and the foot is 34 feet. Project it thus:—Draw a line, as A B, and lay off on it 40 feet for the after leach, then, with 60 feet on your compasses, and one leg on B, describe an arc as at c, and, with 34 feet on your compasses and one leg on A, describe an arc cutting the other at c. Draw B C and A C, and the sail is formed.

To find the Foot Roach.—Lay a square on A B and let the other side touch C, draw C D, extend B A to D, and from D to A is the foot roach.

To find the number of Cloths in the Foot.—Divide the distance C D by the breadth of the canvass, less $2\frac{1}{2}$ in. for seam. The quotient is the number required.

To find the Luff Gore.—Divide the distance B D by the number of cloths in the foot. The quotient is the required gore. It is found better in practice to put longer gores in the foot than in the head, to throw a round in the luff; and, indeed, in low clued jibs this is indispensable to keep the sail from drumming, and to do away with that tightness across the belly of the sail from the clue towards the luff. In low clued jibs, the first gore ought to reach as high as the foot is roached; but in jibs with a high clue, such as this, it must not go so high, and the length of them must be determined by the judgement of the cutter. In the figure, each cloth has $35\frac{1}{2}$ inches gore; but by throwing a round into the luff, commencing at the foot,

The 1st has $60\frac{1}{2}$ inches, being 25 inches more than mean gore.

| | | | | | |
|-------|-----------------|---|----|---|---|
| 2nd " | $50\frac{1}{2}$ | " | 15 | " | " |
| 3rd " | $40\frac{1}{2}$ | " | 5 | " | " |
| 4th " | $35\frac{1}{2}$ | " | 0 | " | " |
| 5th " | $35\frac{1}{2}$ | " | 0 | " | " |

—45

The after leach, commencing at the head,

1st gore has $26\frac{1}{2}$ inches, being 9 inches less than mean gore.

| | | | | | |
|--------|-----------------|---|---|---|---|
| 2nd " | $27\frac{1}{2}$ | " | 8 | " | " |
| 3rd " | $28\frac{1}{2}$ | " | 7 | " | " |
| 4th " | $29\frac{1}{2}$ | " | 6 | " | " |
| 5th " | $30\frac{1}{2}$ | " | 5 | " | " |
| 6th " | $31\frac{1}{2}$ | " | 4 | " | " |
| 7th " | $32\frac{1}{2}$ | " | 3 | " | " |
| 8th " | $33\frac{1}{2}$ | " | 2 | " | " |
| 9th " | $34\frac{1}{2}$ | " | 1 | " | " |
| 10th " | $35\frac{1}{2}$ | " | 0 | " | " |
| 11th " | $35\frac{1}{2}$ | " | 0 | " | " |
| 12th " | $35\frac{1}{2}$ | " | 0 | " | " |

—45

Consequently the luff of the sail is still the same length,

60 feet, and a round thrown in the luff, as per dotted line.

Throw a round in the foot, as in the foot of the spanker, increasing them from tack towards clue; thus the whole gore is 10 feet 6 inches. 126 inches to be put into 17 cloths, therefore say—

| | | |
|-----------|-------------|--------|
| 1 | 1 | 1 |
| 2 | 1 | 1 |
| 3 | 1 | 1 |
| 4 | 2 | 2 |
| 5 | 3 | 3 |
| 6 | 4 | 4 |
| 7 | 5 | 5 |
| 8 | 6 | 6 |
| 9 | 7 | 7 |
| 10 | 8 | 8 |
| 11 | 9 | 9 |
| 12 | 10 | 10 |
| 13 | 11 | 11 |
| 14 | 12 | 12 |
| 15 | 13 | 13 |
| 16 | 14 | 15 |
| 17 | 15 | 18 |
| <hr/> | | |
| 158 | 122 | 126 |
| Too much. | Too little. | Right. |

And mark each cloth in the draft with these figures that no mistake may be made in cutting the cloth.

To Cut the Cloths of this Sail.—Measure off 18 inches foot roach of clue after leach cloth, and measure up on the short selvage 40 feet, and mark it. Measure back on the same selvage $26\frac{1}{2}$ inches, run across the canvass by a thread, then mark the selvage, and cut from mark to mark. [At all times crease the measuring cloth.] For the second cloth, increase the gore on the canvass 1 inch, and with the long selvage of canvass measure down the short selvage of the first cut cloth, mark the selvage, measure down 15 inches, run across the can-

less 1 inch for seam, 19 feet 4 inches \div 23 inches, is 10 cloths and 2 inches of another cloth.

To find the Luff Gore on the Upper Triangle or Head of the Sail.—Divide the distance B L by the number of cloths in the triangle.

To find the Luff Gore in Lower Triangle.—Divide the distance o c by the number of cloths in the triangle—the quotient is the gore. If you wish to increase the round in the luff, lessen the luff gores of the 2 lower cloths, and increase it the same in the 5th and 6th cloths.

Tabling on luff, 6 inches.

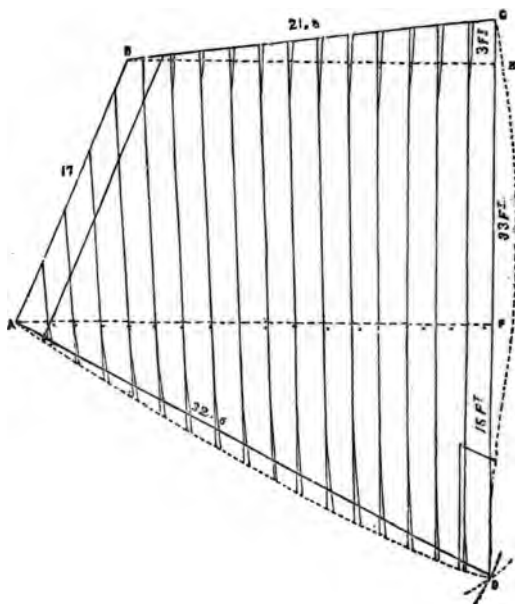
„ on after leach, 4 inches.

„ on foot, $1\frac{1}{2}$ inches.

There can scarcely be a mistake made in cutting the canvass for this sail. By cutting one of the triangles at a time, the gores being the same, not an inch of canvass may be lost after the centre gore of the first cloth is cut. To throw a round in the foot, put another cloth on the full breadth at 1-3rd from the clue, and off to nothing at clue and tack, as per dotted line.

**SPANKER OF A SHIP OR BARQUE, OR BOOM MAINSAIL
OF A BRIG, OR MAINSAIL OF A SCHOONER OR
SMACK.**

FIG. 11—SPANKER.



Measure the length of the gaff from throat to hounds, fasten a line to hounds to give you the length of after leach, and hoist the gaff to the position required.

Measure the boom from throat to 3 feet from end, or less 1-16th, and mark it as you wish it to be when the sail is set, and let it be topped to the required position.

Measure from the jaws of the gaff to the jaws of the boom.

Measure from the jaws of the gaff to mark made at boom end, and mark the line that is attached to gaff at this spot on boom end, and measure it.

- | | | | | | | |
|----|------------------------------|---|---|---|---|--------------|
| 1. | Length of gaff, | - | - | - | - | 21 ft. 6 in. |
| 2. | " of boom, | - | - | - | - | 32 " 6 " |
| 3. | " from jaws of gaff to boom, | - | - | - | - | 17 " 0 " |
| 4. | " " " boom end, | - | - | - | - | 37 " 0 " |
| 5. | " of after leach, | - | - | - | - | 33 " 0 " |

To Project this Sail.—1st, Draw a line at pleasure (from any convenient scale, the larger the better) representing the mast, as A B, 17 feet. 2nd, Take on your compasses the length of the boom, and with one foot at A describe an arc at D. 3rd, Take on your compasses the diagonal distance, and with one foot on B cut the arc at D. 4th, Take the length of the gaff on your compasses, and with one foot on B describe an arc at C. 5th, Take the length of the after leach on your compasses, and with one foot on D cut the arc at C. 6th, Join A to the cutting point of contact at D—this gives the angle the boom makes with the mast. 7th, Join B to the cutting point of contact at C. 8th, Join C D. This gives you the form of the sail and the gores.

To find the Roaches.—Lay a square on C D touching B, draw a faint line B E, move the square down to A, and draw A F. The distance C E is the head roach, and D F the foot roach.

To find the number of Cloths in the Head—Divide the distance B E by 22 inches, thus— $21.6 \div 22 = 11$ cloths and 16 inches of another cloth; allow 6 inches for tablings = 12 cloths.

To find the number of Cloths in the Foot.—Divide the distance A F by 21 inches, thus—A F is 29 feet = 348 \div 21 = 16 cloths 12 inches, or $16\frac{1}{2}$ cloths; allow tablings, 9 inches = 17 cloths.

To find the Head Gore on each Cloth.—Divide C E, 3 feet, by the number of cloths in the head; the quotient

is the gore on each cloth, thus—3 feet \div 12 = 3-inch roach on each cloth.

To find the Foot Roach on each Cloth.—Proceed as in the mainsail, increasing from clue to tack, thus—from F to D is 15 feet = 180 inches.

| Cloths | | | |
|--------|-------------|-----------|--------|
| No. | 1. | 0 | 0 |
| 2. | 1 | 1 | 0 |
| 3. | 2 | 2 | 2 |
| 4. | 3 | 3 | 3 |
| 5. | 4 | 4 | 4 |
| 6. | 5 | 5 | 5 |
| 7. | 6 | 6 | 6 |
| 8. | 7 | 7 | 7 |
| 9. | 8 | 9 | 9 |
| 10. | 10 | 11 | 11 |
| 11. | 12 | 13 | 13 |
| 12. | 14 | 15 | 15 |
| 13. | 16 | 17 | 17 |
| 14. | 18 | 19 | 19 |
| 15. | 20 | 21 | 21 |
| 16. | 23 | 24 | 23 |
| 17. | 26 | 27 | 25 |
| | 174 | 183 | 180 |
| | Too little. | Too much. | Right. |

This throws a good round into the foot of the sail; and to know whether or not you are correct, divide the whole roach by the number of cloths, and if your centre cloth has nearly the mean roach, you may presume you are pretty nearly right; and for a guide begin at the centre cloth with the mean roach, and increase the roaches towards the tack in the same ratio as they are decreased towards the clue.

To find the Gore in the Luff.—Measure the square of the sail from B to the line A F, or from E to F, and divide this distance by the difference of cloths betwixt the head and foot. In the present case we have

cloths more in the foot than in the head, and the distance from E to F is 15 feet, which divided by 5 gives 3 feet; measured on the after selvage.

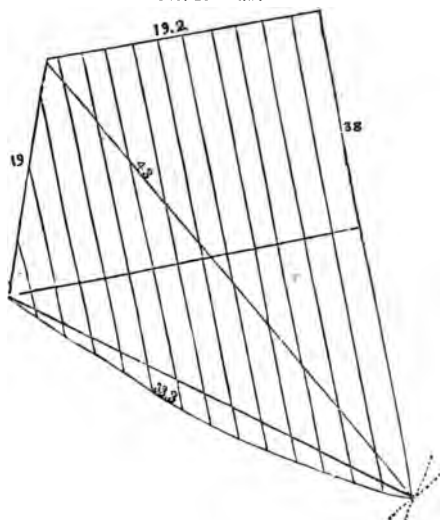
To Form the Round on the After Leach.—In measuring the canvass add 1 inch to every 4 feet in length to the after leach cloth, and distribute it equally over five or six of the after leach cloths. If the head of the sail is narrow it must be taken in quicker, say in five cloths, but with a broad-headed sail it may go over six or seven cloths. It must be puckered up in the sewing, and more towards the head than the foot, or puckered gradually in above the reefs.

To Cut the Cloths of this Sail.—Having determined the gores and roaches, and made a rough plan, on which these are all marked for reference, measure off the canvass 33 feet, to which add 5 inches for tablings and 8 inches for round in after leach, making 34 feet 1 inch. Mark the selvage here and measure back 3 inches for head roach, run across the canvass by a thread and mark the selvage, and cut from mark to mark (and number this 1). For the 2nd, then with the long selvage of the canvass measure down the short selvage of No. 1, from it take 1 inch for round in after leach, and as it is square on the foot cut right across. For the 3rd cloth, gore the canvass 2 inches, and with the long selvage measure up the short selvage of No. 2, from which take 1 inch for round in after leach, and mark the cloth here. Measure back 3 inches for head roach, run across the canvass by a thread, mark the selvage, and cut from mark to mark. Proceed in this way, measuring down and up, and up and down alternately, increasing the foot roaches, and decreasing the lengths of those marked for round in after leach, until all the cloths in head are cut. Then suppose the 12th cloth was last cut, the canvass is roached 15 inches, increase the roach 2 inches, and with the long selvage measure up the short selvage of No. 12 and mark it; measure back 3 feet, run across the canvass by a thread.

mark the selvage, and cut from mark to mark, and number it 13. For 14th, crease the short selvage of No. 13, and with the long selvage of the canvass measure down the short side of No. 13, and cut from the roaches as before. After all are cut, stitch the luff together and measure it to be certain that you are correct.

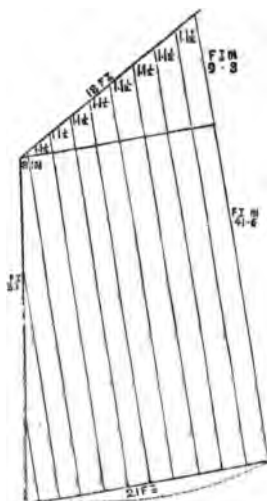
The usual breadth of seam is put in the body of this sail, but from the head 4 feet down it should be 2 inches broad, and from the foot 6 feet up it ought to be 3 inches broad—this is to throw the belly of the sail out to the after leach. Be careful to mark the number on each cloth as cut, putting those you have done with to one side, and in long gores crease the cloth before measuring from it.

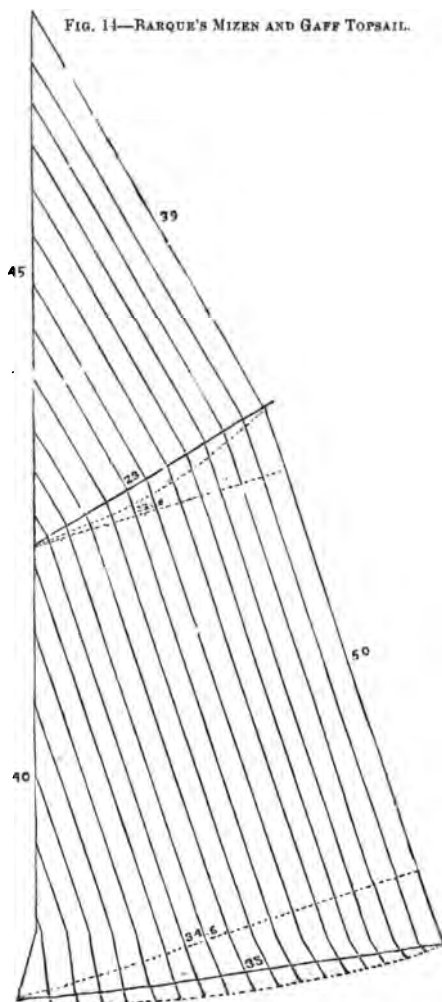
FIG. 12—TRYSAIL.



A ship's fore and main trysail, and all gaff sails, are measured in the same manner as the spanker, and the gores on the head and foot depend on the breadth the head bears to the foot. In Figure 12 (a trysail), the roaches are all in the foot, and in Figure 13 (a schooner's foresail), the roaches are all in the head. Figure 14 represents a barque's mizen and gaff topsail, the mizen having the roaches in both head and foot.

FIG. 13—SCHOONER'S FORESAIL.

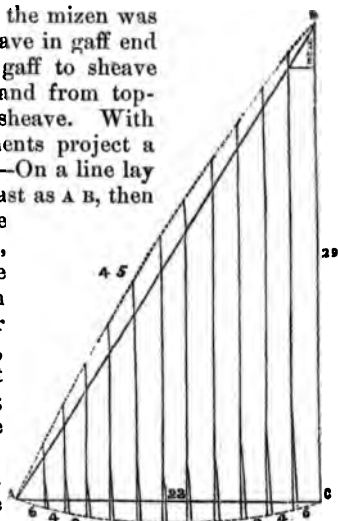




GAFF TOPSAIL.

FIG. 15—GAFF TOPSAIL.

Place the gaff as if the mizen was set : measure from sheave in gaff end to jaws, from jaws of gaff to sheave hole in topmast head, and from topmast head to gaff end sheave. With these three measurements project a figure as No. 15, thus—On a line lay off the length of the mast as A B, then with the length of the gaff on the compasses, one point on A, describe an arc as at C, then with the length of the afterleach on the compasses, and one foot on B, cut the former arc at C ; join A C, B C, and the sail is formed.



To find the Foot Gore.—Lay a square on the afterleach B C, and with one side on A, mark A C as with the mizen. In this figure the foot is square, and to prevent it from turning up in the foot, roach as in the figure—the greatest roach being in the centre of the foot.

To find the Luff Gore.—Divide the length of the afterleach by the number of cloths in the foot—the quotient is the gore on each cloth.

All angular sails having the cloth at the foot square are roached in this manner—the cloth increasing from clue to centre, and decreasing in length from centre to tack.

To throw a round into the luff of this sail, increase the length of the gores at the foot, and decrease them the same at the head (same as jib, which see), and crease the seams from foot 3 feet up $2\frac{1}{2}$ inches.

TOPMAST OR TOPGALLANT STUDDINGSAIL.

FIG. 16—TOPMAST STUDDINGSAIL.

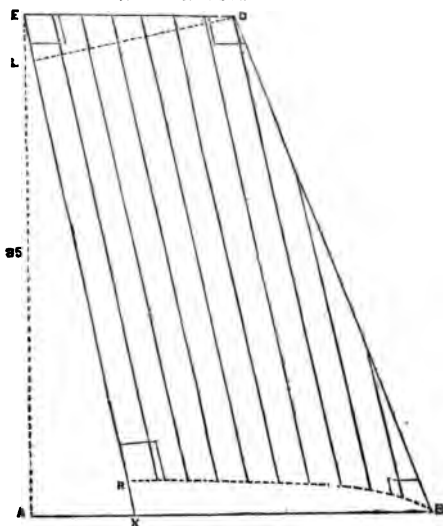
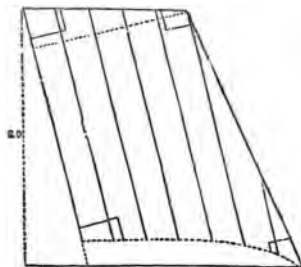


FIG. 17—TOPGALLANT STUDDINGSAIL.



To Measure for Topmast or Topgallant Studdingsail.—
Take the length of the leach of topsail or topgallantsail,
whatever number of cloths you think proper in the

head and foot of the studdingsail, and proceed thus:— Draw a line representing the boom, as AB ; on A raise a perpendicular as AE , and towards B mark off the gore of topsail or topgallantsail as at x ; from x towards E lay off the length of leach; from E parallel to AB draw ED ; join xE and DB , and the sail is formed.

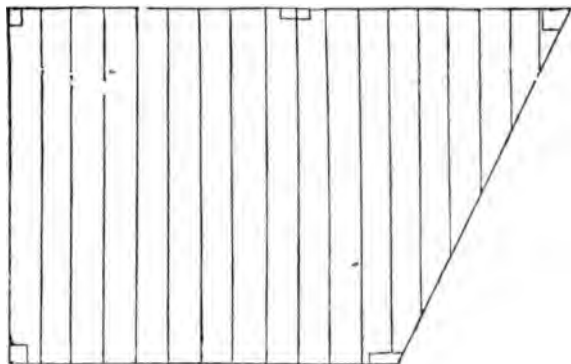
To find the Leach Gore.—You have three cloths in the foot more than in the head, therefore the depth of the sail AE , divided by 3, will give you the gore on each cloth.

The *Foot Roach* is found as in the topsail.

The *Head Roach*.—Lay a square on the inner leach and let the other part rest on D , draw DL , and from L to E is the roach, which divide by 7 for the roach in each cloth.

In cutting the cloths, cut the inner cloth 2 feet short of this measurement, as at R , for roaches.

FIG. 18—LOWER STUDDINGSAIL.

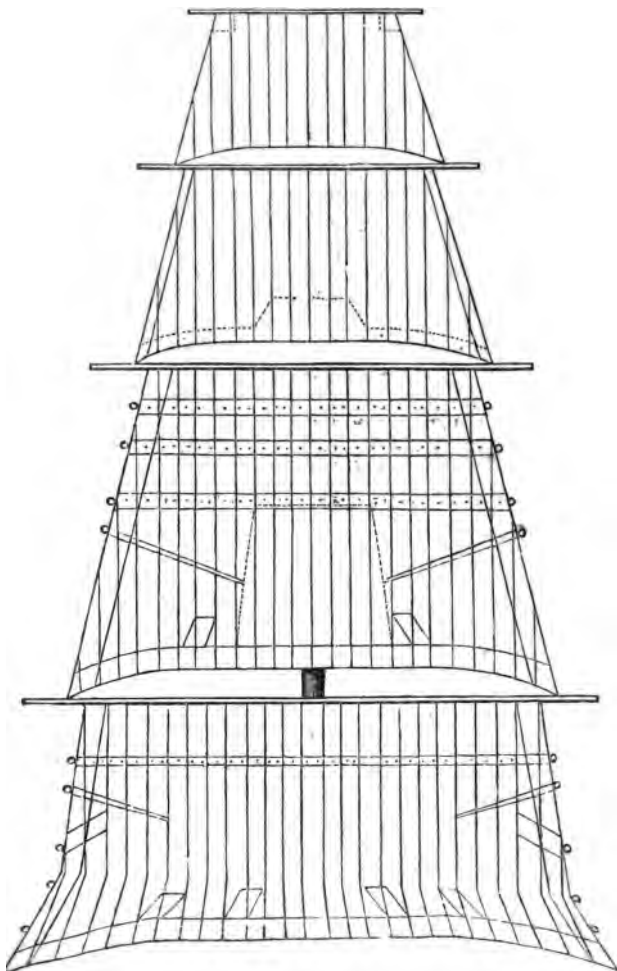


The *Lower Studdingsail* is generally made square. I have used them with great advantage as per figure (see swinging-boom). The square one requires no remarks.

To find the gore of the outer leach, divide the depth of the inner leach by the number of cloths more in the head than in the foot—the quotient is the gore on each cloth.

The head rope of this sail out to be as heavy as the leach rope.

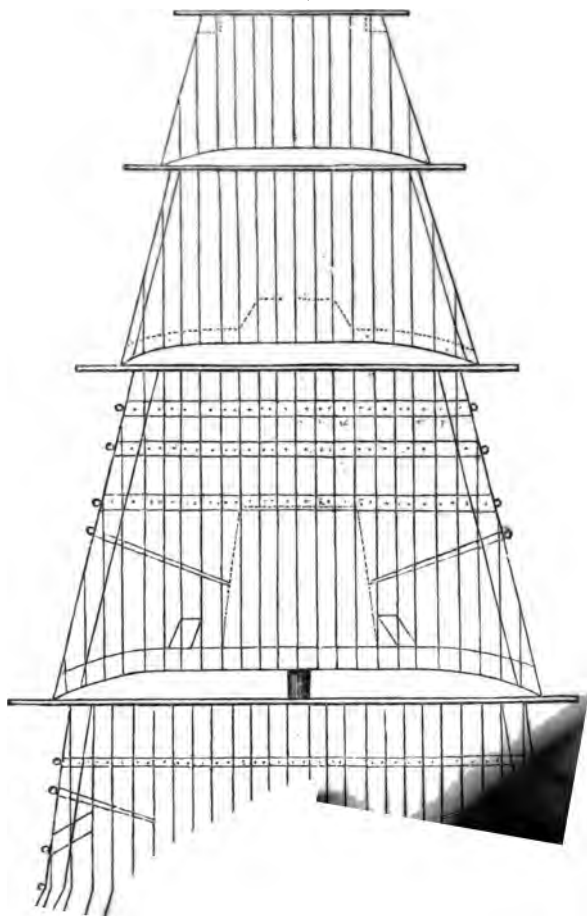
FIG. 19—VIEW OF THE FORE PART OF THE MAINSAIL, MAINTOPSAIL, TOPGALLANTSAIL, AND ROYAL.



PART III.
ON BOOK-KEEPING.

HINTS TO YOUNG SHIPMASTERS.

1.—VIEW OF THE FORE PART OF THE MAINSAIL, MAINTOPSAIL, TOPGALLANTSAIL, AND ROYAL.



PART III.

GENERAL REMARKS ON BOOK-KEEPING.

THE author felt the want of a form of keeping ships' accounts for some time after he got command of a ship; and having heard many complain of the same, he begs to offer the following suggestions to those who have been similarly situated.

The undermentioned books are recommended :—

A Memorandum Book, where every transaction of the day should be entered, or it may be called a daily log.

A Cash Book, into which all cash transactions are entered daily, and daily balanced, so that any mistake or loss may be rectified or known.

A Disbursement Book, into which all moneys paid on account of ship are entered, and into which an account current or balanced sheet is put. This should be balanced at the expiration of each voyage, and on no account should one voyage's accounts be permitted to run into another. The disbursement book should be closed on the day of discharge, or as soon after as possible.

A Seaman's Account Book, which may likewise contain your portage bill.

A Stock and Expenditure Book, into which an account of your ship's stores and provisions are inserted, showing at any time your expenditure and stock on hand.

Though these at first sight may appear too many, yet they are by a little practice easily kept; and much time and reflection afterwards may be saved, and even a pleasure derived from the keeping of them. The

following are extracts from the writer's books on a voyage from Liverpool to Calcutta, Penang, Singapore, China, and London, where the first voyage terminates. Second voyage, from London to Odessa, Falmouth, Limerick, and Glasgow.

MEMORANDUM BOOK.

Jan. 26.—Chartered ship to Messrs B. & Co., for slump sum of £750. Entered ship for graving dock, paid fee £1 1s. Engaged with a rigger to send down foretopmast and send up new one, set rigging up fore and aft, transport the ship to graving dock and back to loading berth, reave running rigging, bend sails, lash spars and water casks, clear up decks, hang anchors in the tackles, and haul her to dock gates when loaded, for £6 10s.

Paid for clearing up hold, 12s 6d.

Jan. 27.—Engaged with a painter to paint cabin, bulwarks, all deckwork, outside head and stern, and gild them, for £7.

Engaged with carpenter (Mr B.) to strip, caulk, and recopper, for £55 10s.

Engaged with Messrs B. & Co. for yellow metal at 75s per cwt., and felt at 3½d per sheet. Ordered 1000 sheets of metal, 700 of felt, and 8 cwt. of 1½-inch nails.

Jan. 30.—Sold the old nails and sweepings of the dock for £10 10s, and received the same.

Engaged with stevedore at 9d per ton. Sent old copper to Messrs B. & Co., weighing 36 cwt. 2 qrs. 7 lbs.

Feb. 1.—Paid for hauling old copper out of dock, 12s 6d; paid rigger to account, £2.

Paid mate, 25s; boys' board, 21s; shipkeeper, 18s; paid for carting ballast, £1 10s.

Feb. 3.—Engaged James Chapman, ship's carpenter, *harbour pay*, 25s per week; *sea pay*, £4 5s per month. Sent remainder of old copper to Messrs B. & Co.,

weighing 1 cwt. 2 qrs. 15 lbs., and returned all the old cases that brought the felt and copper, and the bags which brought the nails; and returned 46 sheets of felt, 80 sheets of copper weighing 4 cwt. 3 qrs. 16 lbs.

On ship's bottom, 913 sheets of metal, weighing 53 cwt. 2 qrs. 5 lbs.; 7 cwt. 3 qrs. 6 lbs. of nails. Kept for ship's use—nails, 22 lbs.; metal, 7 sheets.

Engaged J. B., second mate, at £8 per month.

Feb. 6.—Shipped a crew, and signed advanced notes for £50. Signed and retained copies of the tradesmen's bills.

Feb. 8.—Engaged with J. G. for steamer to tow us to N.W. buoy for £10: charterers paying half. Paid rigger, £2.

I will not carry this further, and this is only a sample of a few things contained in it. I consider the memorandum book of so much importance that I would not be without it on any consideration. I keep it for reference.

THE CASH BOOK

Is of a private nature; I will only give a sample of it, but will carry the disbursement book throughout the voyage.

DISBURSEMENT BOOK.

It is customary for the shipmaster to sign all bills against the ship, and send them to his consignee for payment; in this case the shipmaster should satisfy himself that the sums have been paid, and enter in his disbursement book these accounts as paid by himself—the agent's account current being a voucher, giving the ship credit for the full amounts, either drawn for, or received as freight.

Some masters hand in to the owners the consignee's account current, with another of their own, debiting themselves with the cash received, and only what has gone through their hands. This is a very loose way, and as your disbursement book may be considered at

all times a book of reference, giving you an idea of the expenses of the different ports, you should be particular and enter everything; and if port charges are expensive, keep them as an item clear from the disbursements.

Ship's Account.

A shipmaster should make out and hand to his owner the following papers, viz.—a freight list, signed by the consignee; a bill of disbursements; a portage bill, with ship's agreement attached; and an account current.

THE CASH BOOK.

Cash Received.

| | | | |
|-------|----------------------------|-------|-------|
| 1846. | | | |
| Feb. | To balance from last week, | - £34 | 3 6 |
| | „ old copper and nails, | - 10 | 10 0 |
| | | | <hr/> |
| | | £44 | 13 6 |

Cash Paid.

| | | | |
|----------|------------------------------------|------|-------|
| 1846. | | | |
| Feb. | By booking for graving dock, | - £1 | 1 0 |
| Jan. 26. | „ clearing up ship's hold, | - 0 | 12 6 |
| | „ riggers' tide-work, | - 0 | 5 0 |
| 29. | „ Horsburgh's Directory (private), | 4 | 10 0 |
| | „ binnacle for ship, | - 3 | 5 0 |
| | „ hauling old copper up from dock, | 0 | 12 6 |
| Feb. 2. | „ rigger to account, | - 2 | 0 0 |
| | „ Mr Mitchell, mate, 1 week's pay, | 1 | 5 0 |
| | „ apprentices' board, | - 1 | 1 0 |
| | „ shipkeeper, | - 0 | 18 0 |
| | „ discharging ballast, | - 1 | 10 0 |
| | | | <hr/> |
| | | £17 | 0 0 |
| | Balance on hand, | - 27 | 13 6 |
| | | | <hr/> |
| | | £44 | 13 6 |

| | | | |
|------------------------------|-------|----|---|
| Balance from last week, - - | £27 | 13 | 6 |
| Feb. 7. Cash from owner, - - | 30 | 0 | 0 |
| | <hr/> | | |
| | £57 | 13 | 6 |
| | <hr/> | | |

| | | | |
|--|-------|----|----|
| Feb. 5. Paid for Lee's Manual (private), | £0 | 5 | 0 |
| „ nautical almanac (p.), | 0 | 5 | 0 |
| „ parallel rulers 7s 6d, charts | | | |
| 18s (private), - - | 1 | 5 | 6 |
| „ dunnage wood 15s, coals £9, 9 | 15 | 0 | 0 |
| „ cab '3s, sextant £10 10s | | | |
| (private), - - | 10 | 13 | 0 |
| „ barometer, - - | 3 | 5 | 0 |
| „ lumper putting coals on | | | |
| board, - - - | 0 | 18 | 0 |
| „ dunnage mats and wood, | 1 | 7 | 6 |
| „ riggers to account, - | 2 | 10 | 0 |
| „ cooper repairing casks, | 0 | 5 | 3 |
| „ boy Bruce £3 4s 6d, M'Neil | | | |
| £2 16s 4d,—clothier, | 6 | 0 | 10 |
| „ mate's week's pay 25s, | | | |
| shipkeeper 18s, - | 2 | 3 | 0 |
| „ ship carpenter 21s 11d, | | | |
| steward 9s, - - | 1 | 10 | 11 |
| „ captain's board, 2 weeks | | | |
| at 25s, - - - | 2 | 10 | 0 |
| „ rigger's balance, - | 2 | 0 | 0 |
| „ cash taken to sea, - | 12 | 19 | 7 |
| | <hr/> | | |
| | £57 | 13 | 6 |
| | <hr/> | | |

DISBURSEMENT BOOK.

Disbursements paid on account of Ship.

1845.

LIVERPOOL.

Jan. Paid booking fees for graving dock, £1 1 0

Carry forward, - - £1 1 0

| | | | | | | |
|------|----------------------------------|---|---|-------|----|----|
| | <i>Brought forward,</i> | - | - | £1 | 1 | 0 |
| Jan. | Paid clearing up ship's hold, | - | - | 0 | 12 | 6 |
| | „ tides work for two riggers, | - | - | 0 | 5 | 0 |
| | „ ship's binnacle, | - | - | 3 | 5 | 0 |
| | „ hauling old copper from dock, | - | - | 0 | 12 | 6 |
| | „ mate's weekly pay, | - | - | 1 | 5 | 0 |
| | „ apprentices' board, | - | - | 1 | 1 | 0 |
| | „ shipkeeper's pay, | - | - | 0 | 18 | 0 |
| | „ discharging ballast, | - | - | 1 | 10 | 0 |
| | „ dunnage wood, | - | - | 0 | 15 | 0 |
| | „ coals, | - | - | 9 | 0 | 0 |
| | „ barometer, | - | - | 3 | 5 | 0 |
| | „ lumper putting coals on board, | - | - | 0 | 18 | 0 |
| | „ dunnage mats, | - | - | 0 | 12 | 6 |
| | „ dunnage wood, | - | - | 0 | 15 | 0 |
| | „ cooper, | - | - | 0 | 5 | 3 |
| | „ mate's pay, 1 week, | - | - | 1 | 5 | 0 |
| | „ shipkeeper's do. | - | - | 0 | 18 | 0 |
| | „ carpenter's 6 days' pay, | - | - | 1 | 1 | 10 |
| | „ steward's 3 days' pay, | - | - | 0 | 9 | 0 |
| | „ rigger, as per agreement, | - | - | 6 | 10 | 0 |
| | „ captain's board, | - | - | 2 | 10 | 0 |
| | | | | <hr/> | | |
| | | | | £38 | 14 | 7 |
| | | | | <hr/> | | |

CALCUTTA.

| | | Rupee. | Anna. |
|-------------------------------|-----|--------|-------|
| Paid dingie for vegetables at | | | |
| Fultah, | - | 3 | 12 |
| „ for 20 Lascar coolies to | | | |
| moor, &c., | - | 4 | 0 |
| „ for tank water jars, | - | 27 | 12 |
| „ for postages, | - | 3 | 8 |
| „ shipchandlers, as per ac., | 123 | 4 | |
| „ bazaar, as per account, | 110 | 7 | |
| „ sea stock, as per ac., | 73 | 4 | |
| „ batta Lascars, as per ac., | 43 | 2 | |
| | | <hr/> | |
| <i>Carry forward,</i> | - | 389 | 1 |

| | | | | |
|-----------------------------|---|------|---|-------------|
| <i>Brought forward,</i> | - | 389 | 1 | |
| Paid doctor's attendance, | - | 100 | 0 | |
| „ dingie wallah, | - | 17 | 8 | |
| „ pawlkie hire, | - | 21 | 0 | |
| „ moorings, | - | 54 | 0 | |
| „ pilotage, | - | 430 | 0 | |
| „ commissions, as per acct. | | | | |
| current of P. & C., | - | 1200 | 0 | |
| Exchange at 2s per rupee, | - | 2211 | 9 | = £221 8 1½ |

PENANG.

| | | | | |
|------------------------------|---|-----|----|--|
| Paid hospital bill, | - | \$4 | 54 | |
| „ dubash's bill, | - | 27 | 30 | |
| „ dingie, | - | 3 | 0 | |
| „ pawlkie, | - | 4 | 75 | |
| „ boat hire for fresh water, | | 2 | 0 | |
| „ for yams, | - | 13 | 0 | |
| „ W. Philips, as per ac., | - | 32 | 44 | |
| „ commissions, as per acct. | | | | |
| current, | - | 47 | 47 | |

Exchange at 4s 6d per dollar, \$134 50 = £30 5 3

SINGAPORE.

| | | | | |
|-------------------------------|---|------|----|--|
| Paid Dr. Little for medicines | | | | |
| and visit, | - | \$18 | 77 | |
| „ coolies working on board, | | 17 | 50 | |
| „ dubash for provisions, | - | 16 | 5 | |
| „ spars, | - | 13 | 50 | |
| „ planks and whelps for | | | | |
| windlass, | - | 23 | 25 | |
| „ commissions, as per Messrs | | | | |
| P. & C.'s ac. current, | | 21 | 23 | |

Exchange at 4s 6d per dollar, \$110 40 = £24 18 9½

~~SECRET~~ -KEEPING.

65

| | | | | | |
|-------------------------|---|---|------|----|---|
| Paid Doctor's services | - | - | £9 | 15 | 0 |
| " "ingis wath | - | - | 1 | 5 | 0 |
| " "awikie hwa | - | - | 1 | 1 | 0 |
| " "noornas | - | - | 1 | 5 | 0 |
| " "pilona | - | - | | | |
| " "commencement at home | - | - | £18 | 6 | 0 |
| Interest of £100 | - | - | | | |
| Total | - | - | £574 | 8 | 0 |

CHINA.

| | |
|--|--------|
| Paid for nails, - - - | \$5 0 |
| „ buckets, - - - | 1 70 |
| „ coolies, - - - | 3 75 |
| „ boatmen at Bocatigris and Barboats, - - | 4 0 |
| „ boat hire, - - - | 29 25 |
| „ stevedore, - - - | 33 33 |
| „ Bucton, as per ac., - | 126 25 |
| „ carpenter, as per ac. for caulking, - - | 45 0 |
| „ Ashoon, painter, as per agreement, - - | 25 0 |
| „ stone ballast, - - - | 69 0 |
| „ doctor's bill, - - - | 10 0 |
| „ coals, 2 tons, - - - | 24 0 |
| „ postages, - - - | 5 80 |
| „ compradore, as per accounts, - - - | 224 93 |
| „ three bolts of canvass, - | 30 0 |
| „ commissions for re- ceiving freight, as per ac. current, - - | 63 50 |
| „ commissions for pro- curing freight, as per ac. current, - - | 393 50 |

Exchange at 4s 6d per dollar, \$1094 1=£246 3 0½

LONDON.

| | |
|--|----------------|
| Paid pilot from Becchyhead to Dungeness, £4 10 0 | |
| „ provisions in Deal, - - - | 4 1 0 |
| „ jerking officers and gatemen, - - | 0 10 0 |
| „ labourers, - - - | 0 14 0 |
| <i>Carry forward,</i> - - - | <u>£9 15 0</u> |

ON BOOK-KEEPING.

85

| | | | | | |
|-------------------------|---|---|--------|----|----|
| <i>Brought forward,</i> | - | - | £9 | 15 | 0 |
| Paid mate 1 week's pay, | - | - | 1 | 5 | 0 |
| „ boys 1 week's board, | - | - | 1 | 1 | 0 |
| „ captain's board, | - | - | 1 | 5 | 0 |
| | | | <hr/> | | |
| | | | £13 | 6 | 0 |
| | | | <hr/> | | |
| Total, | - | - | - £574 | 8 | 9½ |
| | | | <hr/> | | |

PORTAGE BILL.—FIRST VOYAGE.

| Names. | Rank. | Rate of Pay per Month. | Time of Entry. | Time of Discharge. | Time on Board. | Whole Pay. | Advances paid by Owner. | Captain's Advances. | Whole Advances. | Balance. |
|--------|--------------|------------------------|-----------------|--------------------|----------------|------------|-------------------------|---------------------|-----------------|----------|
| | | £ s. d. | | | Mo. Da. | £ s. d. | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| J. G. | Master, - | 10 0 0 | 26th Jan. 1846, | 19th Mar. 1847, | 13 24 | 138 0 0 | 10 0 0 | 32 18 1 | 43 18 1 | 22 5 3 |
| A. M. | Mate, - | 5 0 0 | 9th Feb. " | 10th Mar. " | 13 1 | 65 3 4 | 6 0 0 | 11 7 5 | 17 7 5 | 21 14 7 |
| P. B. | 2nd Mate, - | 3 0 0 | " " | " " | 13 1 | 39 2 0 | 5 0 0 | 1 5 6 | 6 5 6 | 4 16 2 |
| J. C. | Steward, - | 2 10 0 | " " | 22d June, 1846, | 4 13 | 11 1 8 | 4 10 0 | 1 0 4 | 5 10 4 | 4 9 2 |
| J. K. | Cook, - | 2 5 0 | " " | " " | 4 13 | 9 19 6 | 8 10 0 | 2 5 6 | 10 15 6 | 8 4 2 |
| W. H. | Carpenter, - | 4 5 0 | " " | " " | 4 13 | 8 17 4 | 4 0 0 | 0 15 3 | 4 15 3 | 4 2 1 |
| P. W. | Seaman, - | 2 0 0 | " " | " " | 4 13 | 8 17 4 | 4 0 0 | 0 9 0 | 4 9 0 | 4 8 4 |
| J. L. | " " | 2 0 0 | " " | " " | 4 13 | 8 17 4 | 4 0 0 | 0 11 0 | 4 11 0 | 4 6 4 |
| G. A. | " " | 2 0 0 | " " | " " | 4 13 | 8 17 4 | 4 0 0 | 0 13 4 | 4 13 4 | 4 4 0 |
| F. B. | Carpenter, - | 4 15 0 | 6th July, " | 10th Mar. 1847, | 8 4 | 38 12 8 | .. .. | 12 5 9 | 12 5 9 | 26 6 11 |
| W. L. | Seaman, - | 2 5 0 | " " | " " | 8 4 | 18 6 0 | .. .. | 5 14 3 | 5 14 3 | 12 11 9 |
| D. D. | " " | 2 5 0 | " " | " " | 8 4 | 18 6 0 | .. .. | 5 9 8 | 5 9 8 | 12 16 4 |
| J. G. | " " | 2 5 0 | " " | " " | 8 4 | 18 6 0 | .. .. | 4 3 7 | 4 3 7 | 14 2 5 |
| J. H. | " " | 2 5 0 | 14th July, " | " " | 7 27 | 17 15 6 | .. .. | 5 6 8 | 5 6 8 | 12 8 10 |
| W. P. | " " | 2 5 0 | 16th July, " | " " | 7 25 | 17 12 6 | .. .. | 4 17 4 | 4 17 4 | 12 18 2 |
| W. P. | Steward, - | 2 5 0 | 22d Oct. " | 27th Sept. 1846, | 2 11 | 5 6 6 | .. .. | 6 4 3 | 6 4 3 | 11 8 3 |
| S. G. | " " | 2 5 0 | " " | 10th Mar. 1847, | 4 16 | 10 4 0 | .. .. | 5 6 6 | 5 6 6 | 8 9 4 |
| | | | | | | 480 0 2 | .. .. | 1 14 8 | 1 14 8 | 182 8 1 |
| | | | | | | 6 4 6 | .. .. | .. .. | .. .. | 189 12 1 |
| | | | | | | 5 18 0 | .. .. | .. .. | .. .. | .. .. |
| | | | | | | 492 2 8 | .. .. | .. .. | .. .. | .. .. |

W. P., apprentice, as indorsed on his indenture,
 A. N., do. do.

*Disbursements paid by J. G. on account of Ship C. E.,
Voyage Second, from London to Odessa, Falmouth,
Limerick, and Glasgow, in 1847.*

LONDON.

| | | | | | |
|----------|--------------------------------|---|-------|----|---|
| April. | To paid the shiphandler, - | - | £25 | 0 | 0 |
| | „ the sailmaker, - | - | 30 | 4 | 3 |
| | „ the carpenter, - | - | 5 | 10 | 0 |
| | „ for stationery, - | - | 0 | 10 | 4 |
| | „ for coopering casks, - | - | 1 | 15 | 0 |
| | „ the provision merchant, | | 68 | 14 | 0 |
| | „ the butcher, - | - | 4 | 5 | 7 |
| | „ the shipping a crew, - | - | 1 | 1 | 0 |
| | „ the labourers, - | - | 1 | 3 | 6 |
| | „ for coals, - | - | 4 | 15 | 0 |
| | „ riggers, - | - | 3 | 5 | 0 |
| | „ stevedore, - | - | 6 | 10 | 0 |
| Apr. 16. | „ mate, 4 weeks, - | - | 5 | 5 | 0 |
| | „ boy's board, 4 weeks at 10s, | | 2 | 0 | 0 |
| | „ captain's board, „ 25s, | | 5 | 0 | 0 |
| | „ waterman to the Pool, - | | 0 | 10 | 0 |
| | „ landing pilot in the Downs, | | 1 | 0 | 0 |
| | | | <hr/> | | |
| | | | £166 | 8 | 8 |
| | | | <hr/> | | |

CONSTANTINOPLE.

Piastres. Paras.

| | | |
|----------------------------------|---|---------|
| To paid for provisions and vege- | | |
| tables, - | - | 55 0 |
| „ firman, &c., present, | | 225 30 |
| „ Turkish bill of health, | | 47 0 |
| „ Pisanis, shiphandler, | | 2412 10 |

Exchange—110 piastres to £1
sterling, - - - 2750 0 = £25 0 0

ODESSA.

| | Rubles. | Ko. | |
|-------------------------------|---------|-----|-------------|
| To paid port dues and stamps | | | |
| in copper rubles, - | 104 | 20 | |
| „ quarantine and custom | | | |
| charges, - - - | 85 | 0 | |
| „ consulate charges, - | 30 | 0 | |
| „ postages, - - - | 8 | 0 | |
| Exchange at 21·50 to £1 stg., | 227 | 20 | = £10 11 4½ |

ODESSA—(continued).

| | Rubles. | Ko. | |
|----------------------------------|---------|-----|-----------|
| To paid spentidore, as per bill, | | | |
| in silver rubles, - | 343 | 19 | |
| „ labourage, - - - | 95 | 0 | |
| „ doctor, and medicine, | 19 | 31 | |
| „ guardians, and flag | | | |
| book, - - - | 7 | 50 | |
| „ presents to commodante | | | |
| and brand wharf, - | 15 | 0 | |
| Exchange at 3s 4d per ruble, | 480 | 0 | = £80 4 4 |

FALMOUTH.

| | | | | |
|--------------------------------------|---|----|---|------------------|
| To paid for provisions, as per bill, | - | £3 | 5 | 6 |
| „ for canvass and twine, - | - | 2 | 4 | 0 |
| „ for pilotage in, - - - | - | 3 | 5 | 0 |
| „ „ out, - - - | - | 3 | 5 | 0 |
| „ Gilbert for iron-work, - | - | 3 | 5 | 4 |
| „ for paints and oil, - - - | - | 2 | 6 | 0 |
| „ for commissions, - - - | - | 1 | 0 | 0 |
| | | | | |
| | | | | <u>£18 10 10</u> |

LIMERICK.

| | | | | | | |
|------------------------------------|---|---|---|---------------------|----|---|
| To paid pilotage inwards, | - | - | - | £4 | 16 | 0 |
| „ discharging, | - | - | - | 9 | 0 | 0 |
| „ entering and clearing, | - | - | - | 1 | 1 | 0 |
| „ butcher, | - | - | - | 6 | 4 | 0 |
| „ baker, | - | - | - | 0 | 17 | 0 |
| „ pilotage out, | - | - | - | 2 | 10 | 0 |
| „ commissions on freight procured, | | | | 10 | 0 | 0 |
| | | | | <hr/> £34 8 0 <hr/> | | |

GLASGOW.

| | | | | | | |
|---------------------------------|---|---|---|------------------------|----|----|
| To paid pilotage, | - | - | - | £3 | 15 | 0 |
| „ Steam-Tug Company for towage, | | | | 11 | 6 | 6 |
| „ discharging cargo, | - | - | - | 6 | 0 | 0 |
| „ watchman, 2 weeks, | - | - | - | 1 | 10 | 0 |
| „ mate's pay, 2 weeks, | - | - | - | 2 | 10 | 0 |
| „ boys' board and washing, | - | - | - | 2 | 14 | 0 |
| „ master's board, | - | - | - | 2 | 0 | 0 |
| | | | | <hr/> £29 15 6 <hr/> | | |
| Total, | - | - | - | £364 | 18 | 8½ |
| | | | | <hr/> £364 18 8½ <hr/> | | |

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STOCK AND EXPENDITURE BOOK.

In the following form of *Stock and Expenditure Book* a separate page is reserved for each thing—namely, for the canvass account, a distinct page for each number ; and for the rope, a separate page for each size : the form sufficiently explains itself. Besides this, the mate, or whoever has charge of the stores, keeps a daily expenditure book, with general remarks.

Canvass, No. 2.

| Date. | Stock. | Date. | Expenditure. | Remarks. |
|-------------------------|-----------------------------------|--|---|---|
| 1846. April, | Yards. 8 bolts or 120 yards | July 30, Dec. 1, Dec. 28, Jan. 7, March, | Yards. 2½ 40 7 5 24½ 21 | Cover for a life buoy Tarpaulings for the three hatches Mast coats for all the masts Covers for chain locker conductors Best foresail For main trysail |
| 1847. May. May 5, | | " | 120 | . |

Canvass, No. 3.

| Date. | Stock. | Date. | Expenditure. | Remarks. |
|--------|---------------|---|---|---|
| April, | Yards. 200 | April, Nov. Jan. 21, " 26, " 28, " " March, " " April, " | Yards. 18 22 29 28 1 1 1 71 20 14 | For second foretopsail " second maintopsail " second foretopmast staysail " cover for deck-house " draw bucket " cover for azimuth compass " new maintopsail " second foretopsail " best jib " best mainsail |
| | 200 | | 200 | |

Rope Account—2½ inch.

| Date. | Stock. | Date. | Expenditure. | Remarks. |
|--------|-------------------------|---------|--------------|-----------------------------------|
| | | | Fathoms. | |
| April, | 3 coils, or 360 fms. | April, | 130 | Fore and main brace whips |
| | | May, | 21 | For awning (roping) |
| | | July, | 11 | " leach rope for jib |
| | | August, | 10 | " lanyards for jib guys |
| | | Sept. | 23 | " fore bowlines |
| | | Dec. | 21 | " roping topgallant sail |
| | | March, | 90½ | " fore & main topsail brace whips |
| | | May, | 50 | " falls to discharge |
| | | | 3½ | " strops for sundry purposes |
| | 360 | | 360 | |

Marline.

| Date. | Stock. | Date. | Expenditure. | Remarks. |
|--------|--------|-------|--------------|--------------------------------|
| | Hanks. | | Hanks. | |
| April, | 10 | May, | 2 | Gave for general purposes |
| | | June, | 2 | " seizings for rattlings |
| | | | 1 | " foretopsail foot rope |
| | | | 1 | " to marl collar of mainstay |
| | | | 4 | Surplus carried to next voyage |
| | 10 | | 10 | |

Twine.

| Date. | Stock. | Date. | Expenditure. | Remarks. |
|--------|--------|---------|--------------|--|
| | Hanks. | | Hanks. | |
| April, | 30 | April, | 2 | For general purposes, whipping ropes, &c. |
| | | May, | 2 | To sailmaker for repairing old jib, &c. |
| | | June, | 5 | " for repairing mainsail, foretopsail, &c. |
| | | July, | 7 | " for repairing purposes. |
| | | August, | 6 | " to make awning, &c. |
| | | Oct. | 3 | " for repairing maintopsail |
| | | Dec. | 5 | " " old foresail |
| | 30 | | 30 | |

Bread Account—Ship's Bread.

| Date. | Stock. | Date. | Expendi- ture. | Remarks. | Stock on hand. |
|--------|---------|---------|-------------------|--|-------------------|
| | Cwt. | | Lbs. | | |
| April, | 70 | April, | 352 | Sailed 8th ; 16 men at 1 lb. | 7488 |
| | or 7840 | | | daily—22 days | |
| | lbs. | May, | 496 | At sea, 31 days | 6992 |
| | | June, | 480 | " 30 days | 6512 |
| | | July, | 496 | " 31 days | 6016 |
| | | August, | 465 | In harbour, 15 men on board | 5551 |
| | | Sept. | 500 | " 15 men ; served out to labourers, 50 lbs. | 5051 |
| | | Oct. | 496 | At sea, 16 men | 4555 |
| | | Nov. | 480 | " | 4075 |
| | | Dec. | 465 | In harbour, 15 men | 3610 |
| | | Jan. | 465 | At sea, 15 men | 3145 |
| | | Feb. | 448 | " and in harbour, 16 men | 2697 |
| | | March, | 496 | " 16 men | 2201 |
| | | April, | 480 | " " | 1721 |

Beef Account.

| Date. | Stock. | Date of Broach. | No. of days lasted. | Remarks. | On board. |
|--------|----------------|--------------------|------------------------|--|--------------|
| April, | Tierces, 21 | April 8, | 20 | | 20 |
| | | May 1, | 19 | | 19 |
| | | May 20, | 21 | | 18 |
| | | June 10, | 18 | | 17 |
| | | June 28, | 18 | | 16 |
| | | July 16, | 52 | In harbour, 34 days; fresh beef bill, 1088 lbs. | 15 |
| | | Sept. 6, | 21 | | 14 |
| | | Sept. 27, | 20 | | 13 |
| | | Oct. 19, | 18 | | 12 |
| | | Nov. 6, | | Nov. 28th.—Sold two casks; in harbour, 63 days. | 9 |
| | | Jan. 8, | | | |

NOTE.—For the cabin store, I have found the best plan to give to the steward a certain quantity—say for bread 30 lbs., sugar 40 lbs., and so forth, and note the quantities used monthly. Flour, peas, rice, sugar, tea, and coffee, are kept in the same form, and served out by one of the mates, and the account handed to the master weekly.

PART IV.
STOWAGE OF CARGOES,
&c. &c.

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1

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PART IV.

MISCELLANEOUS REMARKS.

STOWAGE OF CARGOES.

INSTRUCTIONS to commanders and mates for the stowage of mixed cargoes, prepared by Henry C. Chapman & Co., Liverpool, and approved and recommended by the committee for managing the affairs of Lloyd's :—

"1. Owners, commanders, and mates of ships are considered by law in the same situation as common carriers. It is therefore necessary that all due precaution be taken to receive and stow cargoes in good order, and deliver the same in like good order. The law holds the shipowner liable for the safe custody of the goods, when properly and legally received on board in good order, and for the delivery to parties producing the bill of lading. The captain's blank bill of lading should be receipted by the warehousekeeper or person authorised to receive the contents. Goods are not unfrequently sent alongside in a damaged state, and letters of indemnity given to the captain by the shippers for signing in good order and condition: this is nothing more nor less than conniving at fraud. Fine goods are often damaged in the ship's hold by lumpers if permitted to use cotton hooks in handling bales. All goods must be received on board according to the custom of the port where the cargo is to be taken in; and the same custom will regulate the commencement of the responsibility of masters and owners.

"2. Hemp, flax, wool, and cotton, should be dunnaged nine inches in the floors, and to the upper part of the bilge, the wing bales of the second tier kept six inches off the side at the lower corner, and two and a-half at the sides. Sand or damp gravel ballast to be covered with boards. For frequently sounded and attended to. Sharp boat one-third less dunnage in floor and bilges. shavings as dunnage from Calcutta.

"3. All corn, wheat, rice, peas, beans, &c., will be stowed on a good high platform or dunnage

less than 10 inches, and in the bilges 14 inches dunnage; the pumps and masts cased, to have strong bulk heads, good shifting boards, with feeders and ventilators, and to have no admixture of other goods. Flat-floored wall-sided ships should be fitted with bilge pumps. On no consideration must the stanchions under the beams be removed.

"4. Oil, wine, spirits, beer, molasses, tar, &c., to be stowed bung up, to have good cross beds at the quarters (and not trust to hanging beds), to be well chocked with wood, and allowed to stow 2 heights of pipes or butts, 4 heights of puncheons, and 6 heights of hogsheads or half puncheons. All moist goods and liquids, such as salted hides, bales of bacon, butter, lard, grease, castor oil, &c., should not be stowed too near 'dry goods,' whose nature is to absorb moisture. Shipowners have often to pay heavy damages for leakage in casks of molasses, arising from stowing too many heights without an intervening platform or twisted deck. From Bengal, goods also are frequently damaged by castor oil.

"5. Tea and flour in barrels, flax, clover, and lint seeds, or rice in tierces, coffee and cocoa in bags, should always have 9 inches at least of good dunnage in the bottom, and 14 inches to the upper part of the bilges, with 2½ inches at the sides, allowed to stow 6 heights of tierces, and 8 heights of barrels. All ships above 600 tons should have 'twixt-decks or platforms laid for the cargoes, to ease the pressure. Caulked 'twixt-decks should have scruppers in the sides, and 2½ inches of dunnage laid athwart ships, and not fore and aft ways, when in bags or sacks, and when in boxes or casks not less than 1 inch. Rice, from Calcutta, is not unfrequently damaged by indigo for want of care in stowage.

"6. Entire cargoes of sugar, saltpetre, and guano, in bags, must have the dunnage carefully attended to, as laid down for other goods. Timber ships are better without 'twixt-decks in loading all timber or deals. Brown sugar to be kept separate from white sugar, and both from direct contact with saltpetre.

"7. Pot and pearl ashes, tobacco, bark, indigo, madders, gum, &c., whether in casks, cases, or bales, to be dunnaged in the bottom, and to the upper part of the bilges, at least 9 inches, and 2½ inches at the sides.

"8. Miscellaneous goods, such as boxes of cheese, kegs and tubs of lard, or other small or light made packages, not intended for broken stowage, should be stowed by themselves, and dunnaged as other goods.

"9. Barrels of provisions, and tallow casks, allowed to stow 6 heights. All metals should be stowed under, and separated from goods liable to be damaged by contact.

"10. All manufactured goods, also dry hides, bales of silk,

or other valuable articles, should have 2½ inches of dunnage against the side, to preserve a water course. Bundles of sheet iron, rods, pigs of copper or iron, or any rough hard substance, should not be allowed to come in contact with bales or bags, or any soft packages liable to be chafed. When mats can be procured, they should be used at the side for silk, tea, &c.

"11. Tar, turpentine, rosin, &c., to have the flat beds of wood under their quarters of an inch thick, and allowed to stow 6 heights.

"12. Very frequent and serious loss falls on merchants on the upper part of cargoes, particularly in vessels that bring wheat, corn, tobacco, oil-cake, &c., arising from vapour damage imbibed by wheat, flour, and other goods stowed in the same vessel with turpentine, or other strong scented articles: the shippers are to blame for such negligence, for not making due inquiry before shipping.

"13. Ships laden with full cargoes of coal, bound round Cape Horn or the Cape of Good Hope, to be provided with approved ventilators as a preventative against ignition.

"14. No vessel bound on any oversea voyage should, on any account, be loaded beyond that point of immersion which will present a clear side out of water, when upright, of three inches to every foot depth of hold, measured amidships from the height of the deck and the side to the water.

"NOTE.—Shippers abroad, when they know that their cargoes will be stowed properly, will give a preference, and at higher rates, to such commanders of ships as will undertake to guarantee the dunnage. The American shipowners, in the stowage of mixed cargoes in large ships have, from experience, discovered what pressure flour barrels, provision casks, &c., will bear, and so avoid reclamation for damage if otherwise properly stowed: hence in large ships above 600 tons, with dimensions exceeding the length 4½ times the beam, and 21 feet depth of hold, orlop decks will come into general use, so as to relieve the pressure by dividing a ship's hold like a warehouse, into stories. A large ship called the *Liverpool*, which left New York in December last, with an entire cargo of flour, has never since been heard of. It is supposed the lower tiers of barrels gave way under the pressure, and the cargo having got loose, shifted in a gale of wind, and capsized the vessel. Ships' cargoes for insurance will also become a matter of special agreement between the merchant and ship-owner, and merchant and underwriter, and the premium vary according to the dunnage agreement. The stowage and dunnage must stand A 1, and is often of more importance than the class of the vessel, as experience has proved. When ships are chartered for a lump sum, the draft of water should be

limited, as it not unfrequently happens that brokers insert a clause that coals are not to be considered as dead weight, in order to fill the ship up in case of goods falling short to make up the chartered freight. All packages, bales, and cases, not weighing more than 15 cwt. to the cubic ton measurement, are designated as light freights.

“Lloyd’s, May, 1851.”

NOTES.

In loading or discharging, be careful not to build up or dig down in one part of the ship’s hold. Work right fore and aft, and clear out from the extremities first, leaving your stiffening and putting your ballast as much amidships as possible. This rule is very applicable: Load into the main hatch, and discharge from the fore and after ones. For the want of attention to this, many ships get hogged even in our docks, as lumpers in general dig down in the main hatch, regardless of the hoist, on purpose to get the ship’s skin to work upon; and seamen, with cargoes such as coals, are very apt to run into the same blunder.

When your ship is in harbour with a clean swept hold, mark the draft of water forward and aft. If this is the sea going trim, load her as near as possible to this trim, and note her draft of water at every 50 or 100 tons put on board. This is very servicable in almost every trade that a ship can go into, for these reasons, viz.:—You know when you have your quantity of stiffening and ballast, and when to stop taking in dead weight to allow the ship to be filled up with lighter goods.

Draft of L— with clean swept hold :

| | | |
|--|---|---------|
| aft, 10 ft. 6—forward, 8 ft. 6—means 9 ft. 6 in. | | |
| with 200 tons on board, | „ | 12 2 |
| „ 300 | „ | „ 13 5 |
| „ 400 | „ | „ 14 7½ |
| „ 500 | „ | „ 15 6½ |
| „ 600 | „ | „ 16 6 |
| „ 700 | „ | „ 17 6 |

| | |
|--|------------------------------|
| with 800 tons on board, | means 18 ft. 4 in. |
| " 900 " | " 19 0 |
| so in the first 200 tons it takes 6 tons | } to put her down 1 inch. |
| 10 cwt. | |
| in the next 100 tons it takes 6 tons 15 cwt. | " |
| " 100 " 6 " | 17 " |
| " 300 " 7 " | " |
| " 100 " 10 " | " |
| " 100 " 12½ " | " |

China Teas.

11 1-9th chests make one ton of 50 cubic feet.

22 half chests make "

50 ten caddie boxes make "

Calcutta Cargo.

| | |
|--|------------|
| Saltpetre in bags, one ton weight measures | 36 feet. |
| Sugar, " " | 39 |
| Rice, " " | 41½ |
| Paddy, " " | 60 |
| Linseed, " " | 54 |
| Poppyseed, " " | 62 |
| Teilseed, " " | 73 |
| Shell-lack, " " | 65 |
| Rum in puncheons, per ton of 242 galls. | |
| measures - - | 70 |
| Treacle in do., one ton weight measures | 64 |
| Jute in bales of 2 cwt., 78 lbs. measure | 11 nearly. |

Teak Timber (Moulmein), in an ordinary well-carrying ship, per ton of 50 feet, takes about 57 feet room, and weighs about 22 cwt.

Peruvian Guano measures 40 feet per ton.

HOW TO PRESERVE FROM ROT.

Ventilate every part of the ship on every opportunity; keep all the corners clean, and if dry, coat them with oil; if damp, put rock salt, and syringe them well with pickle.

Rock salt has been much used and approved of for the preservation of ships from dry rot, and should be used for all colonial ships from the futtocks down to the floorings. For top timbers, deck-knees, beams, transoms, breast-hooks, &c., wood oil is recommended, and not only surface coated but squirted in on top and all round with a good syringe, and when the wood is perfectly dry.

A good stove in the forecastle not only adds to the comfort of the crew but preserves the ship from rot.

WATERWAYS.

When the waterways become leaky, the old wet oakum ought to be all picked out clean, and fresh oakum put in over a thread of spun yarn. The wet oakum, when left in, rots the fresh oakum in a very short time, and destroys the beam-ends and knees. Keep them well coated with paint, to preserve which, mix half a pint of bright varnish in a gallon of paint, and coat them when thoroughly dry. Give them at least two days' sun from the time they were wet until painted.

In varnishing decks or painting any part, be careful to have it perfectly dry—if possible let it be a week without being wet before varnished or painted. The deck being a little dirty is not of so much consequence as its freeness from wet.

In painting the bulwarks or sides, paint the black first if dry weather cannot be depended on, and after it is dry lay on the white. In furnishing paints, endeavour to get the particular colours you want, that nothing remains to do but mix it with oil. This saves the paint, as small quantities can be mixed at convenience.

LONG-BOAT.

The long-boat is generally the worst kept of anything *belonging to a ship*. How to improve its condition, *and at the same time* make it servicable, being much

required, the following plan is recommended :—Put 4 or 6 stanchions into the deck 3 or 4 feet high, having cross pieces of any required height, on which lay the boat bottom up. These cross pieces may likewise support the spare spars. Under the boat, accommodation could be made on a platform for much more stock than can be put into her as is usual at present, or the water could be stowed under her, &c.

ZINC SHEATHING.

The writer has made two voyages to India with this sheathing on, and found it to wear very well, but it does not keep so clean as yellow metal. The following manner of cleaning it he has used with advantage: he recommends it for low-classed iron-fastened ships—copper or yellow metal and it must not be used together. The writer knows two instances of a couple of sheets having been put on ships' bends above yellow metal, and in both instances it did not last on the ship to the equator. In one of these ships two sheathing planks were put between the yellow metal and it, which did not at all save it. The nails of zinc are equally good to galvanised iron ones, and are of value when taken off, which iron ones are not. The zinc used was that of the Vieille Montagne Zinc Mining Company.

HOW TO CLEAN A SHIP'S SIDES AND BOTTOM FROM BARNACLES.

Hang a spare chain or topsail-sheet over the side in bights to windward when the ship is close hauled laying over, or when she is knocking about in a sea-way. This chafing against the barnacles soon clears them off.

For the Bottom.—Take three or four pieces of wood, edged with hoop-iron, and bound together in the form and manner of a common side ladder, pass a lanyard rope under the bottom, from hawse hole forward to taffrail, rove through a block that it may be lead to winch or capstan; fasten the scraper to this rope.

keep a good strain on the fore part of lanyard rope, and heave aft.

For an iron-built ship, a triangular made tank, with scrapers on each side of it, should be put on board as ship's stores, and used as the scraper.

An old condemned hawser, made fast to bowsprit and towed under ship's bottom, has been used with success, especially when ship was running with a strong breeze.

WIRE ROPE

Must soon supersede hemp rope for standing rigging. It is more durable, lighter, stronger, does not give and take in dry and wet weather, and when once set up requires no more trouble. It has not come into such general use as it deserves: when it becomes better known I have no doubt but it will become general. For jib and flying-jib stays it is particularly adapted: the jibs traverse very lightly upon it. For bobstays and bowsprit shrouds it has the preference to chain for being lighter.

The following table shows the difference of weight in comparison to the strength:—

| Breaking Strain in Tons. | Size of Wire Rope. | Weight per 100 Fathoms. | Size of Hemp Rope. | Weight per 100 Fathoms. | Size of Chain. | Weight per 100 Fathoms. | Wire Lighter than Rope per 100 Fathoms. | Wire Lighter than Chain per 100 Fathoms. |
|-----------------------------|--------------------|----------------------------|-----------------------|----------------------------|----------------|----------------------------|---|--|
| | | Lbs. | | Lbs. | | | | |
| 9 | 2 $\frac{1}{4}$ | 450 | 5 | 560 | 9-16ths. | 2000 | 140 | 1550 |
| 12 | 2 $\frac{5}{8}$ | 600 | 6 | 800 | 5-8ths. | 2538 | 200 | 1938 |
| 17 | 3 $\frac{1}{2}$ | 850 | 7 | 1000 | 3-4ths. | 3450 | 250 | 2600 |
| 22 | 3 $\frac{5}{8}$ | 1100 | 8 | 1468 | 7-8ths. | 4500 | 368 | 3400 |
| 28 | 4 | 1400 | 9 | 1850 | 1 | 6490 | 450 | 4090 |

It is particularly well adapted for steamships in the place that chain is now used, as the vast difference of weight from the above table shows.

In setting up wire rigging, care must be taken that the lower rigging is first set up, and with a greater strain than the topmast backstays. When the backstays become too slack and the rigging sufficiently tight, take up a very small piece of the backstays on each side. Do not try to keep the topmast perfectly upright, give it a little lean to leeward. Never set up the lea backstays nor rigging, although it may appear slack. The writer heard of an instance of this having brought a topmast down to windward as soon as the ship was put about on the other tack.

IRON CASKS

Ought to be procured for all oils, tars, varnishes, with a tap in each to draw them off by. The key of the tap to unship (when shut), and only drawn off in the presence of an officer.

HEALTH OF CREW.

There are seldom more hands carried in a merchant ship than are actually required for its safe navigation—consequently, to keep the crew in a good state of health ought to be the master's greatest care and first consideration after getting them on board.

Shipowners, as well as shipmasters, should remember that for the successful prosecution of any voyage a great deal depends upon the crew, and that the greatest difficulties shipmasters have to contend with, both at sea and in port, arise from their dissatisfaction. A knowledge of the chief causes of seamen's discontent, with a few hints how they may be remedied, will not, I trust, be thought superfluous here; and these may be enumerated under the four following heads:—

1st.—FOOD.

2nd.—ACCOMMODATION.

3rd.—MASTER'S DUTY, and general management in reference to the crew's comfort and health.

4th.—TOTAL ABSTINENCE from spirituous liquors, fore and aft.

1st. *Food*.—All provisions put on board should be of the very best quality, and of sufficient quantity for the whole voyage. The dry provisions should be put up in air-tight casks, and well coopered with iron hoops, and tightened every three months: these are bread, flour, peas, oatmeal, and rice. The tea in light iron or tin cases; Cuba or Brazilian sugar, and coffee, in cases in which they are imported; limejuice, in stone jars, each to contain no more than a fortnight's consumption.

Salted provisions to be well coopered, with an extra iron hoop put on each end and bilge before shipment, and stowed carefully away where there will be no chance of disturbing them, and if moved, to be coopered and filled up with pickle. If the voyage exceeds 12 or 15 months, they should be fresh pickled at the middle of this time.

The water to be put into iron tanks or casks, and of sufficient quantity—say, at least, a gallon per day per man.

The cooking should be frequently inspected by the master, who should satisfy himself that the cook and all his apparatus are clean, that the men's food is properly cooked and served up in a clean and tasteful manner, and with as much variety as possible.

2nd. *Accommodation*.—The fore-castle should be of sufficient size (9 feet being far too little), say 20 or 25 feet to each man, well ventilated and lighted, and their bunks made comfortable. A very little expense would put a stove and globe oil or naphtha lamp into it, and a strong deal table with drawers for bread, beef, plates, knives, forks, &c. As one of the crew, a boy or ordinary seaman, should be engaged for fore-castle steward, whose duty would be to lay and clear away the table, clean knives, plates, &c. &c., assist the cook, feed the

stock, clean brass work, binnacle lamp, and such work as is now done with a grudge by the apprentices—on no account is he to be considered as a servant to the crew, but any neglect in his duty to be reported to the master or officer of the watch, who will instantly have it rectified. In ships that have a topgallant forecabin, the centre part might easily be fitted up for a dining cabin, with a table and stools made to unship at pleasure, and a sky light, or a sufficient number of deck lights to give light and ventilation.

3rd. Master's duty, and general management in reference to the Crew's comfort and health.—A master's duty, as before said, is to see that the food is properly cooked and served up, that the forecabin is kept clean and free from dirty and wet clothes, that the bunks are perfectly dry and the bedding aired, and the crew generally as comfortable as his means will admit. He should always be above quarrelling with the crew, and never by any means get angry with them. Heed not a growl (*Ecclesiastes*, vii., 21, 22)—laugh at it as at one a year old, and look on your crew as children that require your care and attention; be kind to them in sickness—any little attention then being highly thought of, and often by this means are the most disaffected brought to be the most quiet, contented, and happy. Be firm, and have your commands obeyed. Be merciful. Rule with kindness, and your crew will obey you through respect more than through fear. Neither punish nor threaten a punishment, for any insubordination, at the time the offence is committed, but after a week or ten days you may choose a convenient opportunity, and inform the offender that you have logged him for the offence, which subjects him to such a punishment, and that you will punish him for it on your arrival at home, unless by his future good conduct he makes amends, and behaves well for the rest of the voyage. This is generally sufficient to quieten him for the voyage. Your greatest duty is to govern your own



THE NUMBER OF DAYS FROM ONE
ER IN THE SAME OR SUCCEEDING

600 Passing from the months of January, March, May, July, August,
 exceeding months, is calculated for the month of 31 days; passing
 700 September, and November, subtract 1 from the number in the above
 of February in common years, and 2 in leap years.
 800 for 30 days to the month, reckon in the above 30 and 31 days as
 900
 1000 by the calendar month—the day of joining the ship and the day of
 1100 one date to another, both inclusive, look in the left hand column
 and in the top or bottom columns for the date of discharge—the
 1200 the two dates is the required number of days. For example,
 inclusive, from 20th March to 10th April—opposite 20 in the left
 3 days for the number required. Again, from 20th June to 10th
 12 days for the number required. Again, from 20th February to 10th March
 It is 2—required number of days, 20.

THE NUMBER OF DAYS FROM ONE
ER IN THE SAME OR SUCCEEDING

REC

| Vessels' Tonnage. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | |
|-------------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 50 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 |
| 60 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 |
| 70 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 |
| 80 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 |
| 90 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 |
| 100 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 110 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 120 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 130 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 140 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 150 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 160 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 170 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 180 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 190 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 200 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 210 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 220 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 230 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 240 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 250 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 260 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 270 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 |
| 280 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| 290 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
| 300 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| 310 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 |
| 320 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| 330 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 |
| 340 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| 350 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 |
| 360 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 |
| 370 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 |
| 380 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 |
| 390 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 |
| 400 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 |
| 410 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 |
| 420 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 430 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 440 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 450 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 460 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 470 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 480 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
| 490 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| 500 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| 510 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| 520 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| 530 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 540 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 550 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| 560 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| 570 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 |
| 580 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 2 | | |

600 passing from the months of January, March, May, July, August,
 exceeding months, is calculated for the month of 31 days; passing
 700 September, and November, subtract 1 from the number in the above
 of February in common years, and 2 in leap years.
 800 for 30 days to the month, reckon in the above 30 and 31 days as
 900
 1000 by the calendar month—the day of joining the ship and the day of
 1100 one date to another, both inclusive, look in the left hand column
 d in the top or bottom columns for the date of discharge—the
 h the two dates is the required number of days. For example,
 1200 inclusive, from 20th March to 10th April—opposite 20 in the left
 2 days for the number required. Again, from 20th June to 10th
 21 days. Again, from 20th February to 10th March
 It is 2—required number of days, 20.







D. M'GREGOR & Co.

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Adjusters of Compasses in Iron Vessels.

CATALOGUE.

Chronometers.

Eight-days Marine Chronometers, of superior quality.
Two-days ditto ditto ditto.
Gold Pocket Chronometers, ditto.
Chronometers Repaired by experienced workmen, and lent on hire.

Watches.

Gold Open-face Pocket Watches, with compensating adjustment for extremes of temperature.
Gold Hunting-cased ditto ditto ditto.
Gold Case Patent Keyless Watches.
Gold Case Patent Automaton-centre Seconds Watch.
Silver Lever Watches, hunting-cased, capped and jewelled, various.
Silver ditto, open face, ditto.
Ladies' Gold Watches, with elegant embossed and engraved cases.

Watches made to any design.

The greatest attention paid to Repairs.

Timepieces.

Eight-days Timepieces, in ornamental marble cases, various.
Eight-days Timepiece for Saloon, English lever movement, with jewelled 'scapement.
Ditto ditto, in bronze and mahogany cases.
Ditto ditto, in round ebony case.
Thirty-hour ditto, in bronze, walnut, or mahogany cases.
Small Portable Eight-day Lever Timepieces, in brass cases.
Ditto ditto, ditto, with alarm.
Ditto Thirty-hour ditto, ditto.

Jewellery.

Gold Guard Chains, various designs.
 Gold Albert ditto.
 Solid Gold Locketts, inlaid and plain.
 Solid Gold Brooches, ditto.
 Gold Studs and Sleeve Links.
 Gold Rings, plain and set with precious stones, &c. &c.

Sextants and Quadrants.

Best Double Plate or Pillar Sextants, with platina or silver arc, divided to 10 seconds.
 Bright Metal Sextant, with improved self-regulating adjusting screws, divided to 10 seconds.
 Bronzed Metal ditto ditto ditto.
 Bright Metal ditto ditto plain adjustments.
 Bronzed ditto ditto ditto.
 Best Ebony Sextants, in polished mahogany case.
 Best Metal Half Sextants, with best adjustments, silver arc, divided to 15 seconds.
 Bronzed Metal ditto ditto ditto.
 Bronzed Metal ditto ditto with ivory arc.
 Best Artificial Horizons, with iron trough, in box, complete.
 Best Ebony Quadrant, with handle, telescope, and ivory arc.
 Ditto ditto, with best adjustments and metal centre.
 Quadrants, with plain adjustments, in case.
 Ditto, with single tangent and index bar.
 Ditto, with double tangent.
 Ditto, ditto and vertical key.

Sextants Repaired, Silvered, and Re-divided.

QUADRANTS REPAIRED, SILVERED, AND ADJUSTED.

Artificial Horizons, of various descriptions, fitted to Sextants.

Telescopes.

Highly Finished Astronomical Telescopes.
 Navy Telescopes, superior quality, with $2\frac{1}{2}$ inch object glass, large and well defined field.
 Ditto ditto, with extra eye-piece.
 Ditto ditto, various, with signals and shoulder belts.
 Ditto ditto, silver mounted, a superior Yachting Glass.

Day or Night Telescopes, plain leather body.

Ditto ditto, with shade and signals.

Ditto ditto, 30 inch body, high power and large field.

Ditto ditto, with two eye-pieces, packed in mahogany case.

Superior Large Field Telescopes, for night only.

Pocket and Tourist Telescopes, in great variety.

Binocular Night Glasses, Opera Glasses, &c.

Powerful Night Glass, with 6 Achromatic Lenses, in patent leather sling cases.

Ditto ditto, with jointed bars to regulate the axis of vision.

Ditto ditto ditto, with double draw tubes for increasing the power.

Ditto ditto, with 12 Achromatic Lenses, large field, and great magnifying power.

Superior Finished Opera Glasses, with rich mountings in morocco or velvet cases.

Ditto ditto, white ivory body.

Ditto ditto, gold plated.

Ditto ditto, enamel body.

Ditto ditto, silver plated.

Exhibition or Perspective Glasses.

Compasses

For ascertaining the Deviation without Calculation.

Small's Patent Azimuth Compass.

Graham's Patent Compass and Binnacle for Iron Vessels.

Prismatic Azimuth Compasses, various.

Patent Spirit Compasses, suitable for Steam Ships, not being affected by vibration.

Patent Floating Compasses, with double dipping and compound needle cards, various.

Best Finished Brass Compasses, with dipping and compound needle card, various.

Plain Brass Steering Compasses, various sizes.

Wood Compasses, ditto.

Transparent Cabin Compasses, various sizes.
 Cabin or Tell Tale ditto, ditto.
 Large Transparent Campasses for Mast Binnacles.
 Best Compasses of every description.
 Pocket ditto ditto.
 Prismatic Azimuth Verge fitted to any size of Binnacle Compass.
 Patent Azimuth Circle and Deviation Detector fitted to any size of Compass.

Compasses Made to any Size or Design.

Repairs carefully executed.

Binnacles.

Brass Binnacle (ornamental column), *Corinthian* pattern, with dome tops and lamps.
 Brass Binnacle (3 dolphins), *Clyde* pattern, with dome tops and lamps.
 Brass Binnacle (3 dolphins), *Liverpool* pattern, with dome tops and lamps.
 Brass Binnacle (3 dolphins), *Ventnor* pattern, with dome tops and lamps.
 Brass Binnacle (3 dolphins), *Seaford* pattern, with dome tops and lamps.
 Brass Binnacle (3 dolphins), *Franklin* pattern, with dome tops and lamps.
 Brass Binnacle (spiral pillar), *Prince of Wales* pattern, with dome top and lamps.
 Brass Binnacle (ornamental pillar), *Windsor* pattern, with dome top and lamps.
 Brass Binnacle (plain pillar), *Dover* pattern, with dome top and lamps.
 Brass Binnacle (fluted pillar), *Lancefield* pattern, with dome top and lamps.
 Brass Binnacle (*Sea Horse* pattern), with dome top and lamps.
 Brass Vase Binnacle, with square base, *Ryde* pattern, with dome top and lamps.
 Brass Vase Binnacle, with octagon base, *Alfred* pattern, with dome top and lamps.
 Tripod Binnacle, with compass, lamps, and brass fittings.
 Mast ditto, ditto ditto ditto.
 Skylight ditto, various designs.
 Mahogany Octagon Binnacle Stands.
Ditto Turned Pillar ditto.

Small Brass Vase Binnacle, with polished mahogany base,
Francis pattern, with dome tops and lamps—suitable for
Yachts.

Small Brass Binnacle (3 dolphins), *Grange* pattern, with dome
top and lamps—suitable for Yachts.

Dome Binnacle Tops, with or without lamps, various sizes.

Taper ditto, ditto, ditto.

Square ditto, ditto, ditto.

Standard, Steering, and Bridge Binnacles, in various styles.

Binnacles Made to any Design.

Lamps and Lanterns.

Sets Admiralty Signal Lamps, large size, for Steam Ships,
heavy brass mounting.

Brass Mounted Anchor Lamps, various sizes.

Tin ditto ditto, ditto.

Deck Lamps.

Cabin ditto.

Saloon ditto.

Gimbal Cabin Lamps for Candle.

Ditto ditto for Oil.

Gimbal Floating Lamps.

Brass Binnacle Lamps.

Forecastle Lamps.

*Signal and other Lamps Repaired, new Lenses and Reflectors
Fitted.*

Lamps Made any Size or to any Design.

Patent Logs and Sounding Machines.

Massey's Patent Log, ordinary and improved construction.

Ditto Sounding Machine.

Walker, Birmingham, Patent Harpoon Log.

Ditto ditto ditto Sounding Machine.

Ditto Liverpool, ditto Log.

Ditto ditto ditto Sounding Machine.

Logs and Sounding Machines made and repaired.

Time Glasses.

Two-hour Glass.

One-hour Glass.

Half-hour Glass.

14 and 28-seconds Log Glasses, in brass frames.

Ditto ditto, in wood frames.

Aural Log Timers.

Speaking Trumpets and Fog Horns.

Brass Speaking Trumpets, various sizes.

Copper ditto ditto.

German Silver ditto ditto.

Brass Fog Horns, single and double tube.

German Silver ditto ditto.

Tin ditto various.

Barometers.

Marine Barometers, in bronze frames, with capillary adjustment.

Ditto, corrected for capacity—recommended by the Board of Trade.

Ditto, with double verniers, and inlaid rosewood frame.

Ditto, single verniers, plain frame.

Aneroid Barometers, with engraved metal dial and two thermometers.

Ditto, with engraved metal dial and one thermometer.

Ditto, with engraved metal dial, without thermometer.

Ditto, with porcelain dial.

Ditto, with enamel dial.

Pocket Aneroids, with revolving raised ring for measuring heights.

Ornamental Bronze Stands and Frames for Aneroids, in great variety.

Bourdon's Patent Metallic Barometers, of every description.

House Barometers, in ornamental frames, with double verniers and capillary adjustments.

House Barometers, without capillary adjustments.

Ditto; in plainer frames.

Superior Wheel Barometers, in great variety.

Fitzroy's Barometers, in various styles.

Sympiesometers and Thermometers.

Adie's Patent Sympiesometer, superior quality.

Ditto ditto ditto, London made.

Ditto Portable ditto, for measuring heights.

Sounding Thermometers, in copper cylinder, with valves for ascertaining the sea temperature at any depth.

Registering Thermometers, various styles.

Window Thermometers, with glass cylinder and mahogany frame.

Exposure Thermometers, various, in copper & japanned cases.

High Range ditto, ditto ditto.

Exposure ditto, in boxwood scales.

Pocket ditto, in morocco cases.

Superheating ditto, to indicate from 500 to 1000 degrees temperature.

Sugarhouse or Vacuum Pan Thermometers, made any size or to any design.

Thermometers Repaired and fitted with New Tubes.

Salinometers, Saccharometers, and Hydrometers.

Howe's Patent Salinometers, with lamps and thermometers complete.

Gold-plated Salinometers, various scales, in mahogany cases.

German Silver ditto ditto ditto.

Glass ditto ditto ditto.

German Silver Saccharometers, various.

Glass ditto ditto.

German Silver Hydrometers, ditto.

Glass ditto ditto.

Twaddle's Hydrometers, Nos. 1, 2, 3, 4, 5, 6.

Oilometers, for testing oils.

Ammonia Meter, for testing ammonia.

Hydrometers Made to any Design or any Specific Gravity.

Steam Gauges, Indicators, &c.

Bourdon's Patent Pressure and Vacuum Gauges.

Schaffer's ditto ditto.

Ditto ditto Hydraulic.

Mercury Gauges, various.

Glass Tubes for Steam Boilers.

M'Naught's Indicators.

Engine Counters, various.

Every description of Steam Gauge Repaired and Adjusted.

Spectacles.

Fine Gold Spectacles, best concave pebble lenses.

Ditto ditto, convex ditto.

Ditto ditto, double sides ditto.

Ditto ditto, ditto, heavy, for presentation.

Sterling Silver Spectacles, best lenses.

Ditto ditto, double frame, best lenses.

Fine Gold Eye Glasses, single concave and convex.

Ditto ditto, double.

Ditto ditto, ditto spring centre.

Sterling Silver Eye Glasses, single.

Ditto ditto, double.

Best Tortoiseshell ditto, single.

Ditto ditto, double.

Ditto ditto, double spring centre.

Patent Riding Spectacles, with very light frame.

Fine Light Steel Frames, pebble lenses.

Ditto ditto, concave lenses.

Fine Light Bronze Steel Frames.

Ditto ditto, patent spring short sides, very suitable for Ladies.

Ditto ditto, very light concave or pebble.

Ditto ditto, double sides.

Fine Tortoiseshell Spectacles, pebble lenses.

Best Eye Preserves, steel frames, large coloured eyes, various tints.

Best Eye Preserves, steel frames, large coloured eyes, various tints, extra large and double sides.

Best Eye Preserves, steel frames, large coloured eyes, various tints, horse shoe, double glass sides.

Drawing Instruments.

- Full Set of Drawing Instruments**, in fish skin case and box-wood scale.
Full Set of Drawing Instruments, in fish skin case and box-wood scale, steel joints.
Full Set of Turned Check Instruments, ivory scale.
 Ditto ditto, in mahogany case, No. 1.
 Ditto ditto, " 2.
 Ditto ditto, " 3.
 Ditto ditto, with proportional compass and brass bound case.
Full Set of Double Joint Instruments, brass or German silver, fine ivory scales.
Full Set of Double Joint Instruments, brass or German silver, fine ivory scales, with Napier Compasses.
Dividers, steel jointed, 5, 6, and 7 inches.
 Ditto ditto, German silver, 5, 6, and 7 inches.
Drawing Pens, ivory handle, steel point.
 Ditto ditto spring.
 Ditto ditto all steel.
Bow Pens, German silver or brass, various.
Bow Pencils, ditto ditto.
Drawing Pens, ditto ditto.
Best Spring Pen or Pencil, Bow, ivory handle.
German Silver Pocket Dividers.
 Brass ditto.
-

C H A R T S .

General Charts—

- North America, from 60° N. to 5° S.
 Northern Ocean, including Davis Straits
 The Ethiopic or South Atlantic
 The North Pacific Ocean
 The South Pacific Ocean
 Indian Ocean, Cape of Good Hope to Australia
 The World, a new large Track Chart

North and East Coasts of America—

- Newfoundland and Banks, large scale
 Gulf of St Lawrence
 River of St Lawrence
 Straits of Belle Isle

Coast of Labrador from Belle Isle to Cape Bluff
 Bay of Fundy
 Cape Canso to New York, with Harbour Plans
 New York to Florida
 Large Scale "Admiralty" Charts, for Coast of Newfoundland,
 America, &c.

West Indies, Gulf of Mexico, &c.—

Gulf of Mexico and West India Islands, large scale
 Windward and Gulf Passages
 Bay of Honduras
 Caribbee Islands and Harbours, large scale
 Coast of Guyana
 Cuba and Bahama Channel, large scale
 Jamaica
 Virgin Islands
 Antigua
 Tobago
 St Vincent
 Barbadoes
 Grenada
 Curacao
 Trinidad
 St Christopher
 St Kitts, &c. &c.
 Large Scale Admiralty Sheets for most of the Islands and
 Ports in the West Indies

Coast of Brazil, West Coast of America, &c.—

Coast of Brazil, River Para to Buenos Ayres
 River Plate, large scale
 Valparaiso to Lima
 Lima to Panama
 Panama to California
 Coiba Island to San Blas
 San Blas to San Francisco
 Coast of Oregon
 Large Scale Admiralty Sheets, Coast of Brazil and West Coast
 of South America
 Large Scale Harbours, and River Plans

British Islands, &c.—

River Clyde, large scale
 St George and Bristol Channels
 North-West and South of Ireland
 Ireland Round, or the above two in one
 West Coast and Islands of Scotland

Pentland Firth and Orkney Islands, large scale
 East Coast of Scotland, Flamborough Head to Cape Wrath
 East Coast of England and Scotland, Dungeness to Flamborough Head
 Thames and Medway, large scale
 English Channel
 Islands in the English Channel
 The whole of the Coasts of Great Britain and Ireland, in large scale Admiralty Sheets

North Sea, Coast of Norway, &c.—

The Cattegat, the Sound and Belts
 The Sound and Danish Grounds
 The Baltic Sea
 The Gulf of Finland
 North Sea, with Plans of Harbours
 North Sea, South part, large scale
 Coast of Norway and White Sea
 White Sea, large scale

France, Spain, Portugal, Mediterranean, &c.—

France, Spain, and Portugal, from England to Gibraltar
 Bay of Biscay
 Straits of Gibraltar, large scale
 Mediterranean Sea, Gibraltar to Malta
 Mediterranean, Malta to Alexandria
 Mediterranean, Gibraltar to Alexandria and Black Sea
 Archipelago, Coasts of Greece, &c.
 Black Sea, with Harbour Plans, large scale
 Gulf of Venice
 West Coast of Africa, Gibraltar to the Cape of Good Hope
 Azores, or Western Islands
 Canary Islands, including Madeira
 Bermudas, or Somer's Islands

India, China, &c.—

Cape of Good Hope, large scale
 Cape and Mozambique Passages
 Islands of Mauritius and Bourbon
 Gulf of Aden
 Arabian Sea
 West Coast of India
 Bay of Bengal
 West Coast of Sumatra
 Bombay Harbour
 River Hoogley
 Straits of Malacca

Straits of Sunda
 Straits of Banca and Gaspar
 Straits of Durian, &c.
 Carimatta Passage
 China Seas, Singapore to Calcutta
 Ditto, Canton to Shanghai
 Eastern Passages to China
 Java Seas and Islands, large scale
 The whole of the China Coast and Harbours, in large scale
 Admiralty Sheets

Australia—

Bass Straits
 Port Phillip
 Port Jackson
 Newcastle Harbour
 The whole Coast in large scale Admiralty Sheets

New Zealand—

New Zealand General Chart
 Auckland Harbour
 Cook Straits
 Foveaux Straits
 Awarua River
 The whole Coast in large scale Admiralty Sheets

Coast of Africa—

Coast of Africa, from Gibraltar to Sierra Leone
 Sierra Leone to the Bight of Benin
 The whole Coast in large Admiralty Sheets, Harbour Plans, &c.

BOOKS.

SAILING DIRECTIONS:

Horsburgh's East India Directory (new edition)
 Directions for the Atlantic and Indian Oceans, by Beecher
 Memoir of the North Atlantic
 Ethiopic or South Atlantic Directory
 South Pacific Directory (two vols.)
 Directions for China and Japan, by Cheyne
 Heckford's Directions for the Sandheads, Rangoon, Moulmein
China Pilot
North Sea Pilot (four vols.)
Gulf and River St Lawrence, by Bayfield

West Indian Directory, Carribbean Sea, Cuba, &c. (two vols.)
 New Zealand Pilot
 Australian Directory (two vols.)
 Coaster's Guide, or Sailing Directions for the Coasts of Great
 Britain, Ireland, &c.
 Blunt's Coast Pilot, for East Coast of North America
 Directory for West Coast of South America
 Ditto for South Coast of Africa, Mauritius, &c.
 Ditto for Mediterranean Sea (two vols.)

Navigation Books.

Norie's Complete Epitome of Navigation
 Raper's ditto ditto
 Mrs Janet Taylor's ditto
 Griffin's ditto ditto
 Bowditch's ditto ditto
 Coleman's Lunar and Nautical Tables
 Thomson's ditto ditto
 Gordon's ditto ditto
 Norie's ditto ditto
 Mrs Janet Taylor's Lunar and Nautical Tables
 Norie's Seaman's Daily Assistant
 Ainsley's Guide to the Local Marine Board
 Ditto ditto ditto (Extra Examination)
 Mrs Janet Taylor's Guide to the Local Marine Board
 Ainsley's Examiner in Seamanship
 Mrs Janet Taylor's Examiner in Seamanship
 Catechism of Navigation
 Spherical Trigonometry and Key
 Spherical Astronomy and Key
 Self-Instructor in Navigation, by W. H. Rosser
 Method of Finding a Ship's position at Sea, by Sumner
 Great Circle Sailing, various
 Chronometer's Companion
 Planisphere of the Stars
 M'Gregor's Tide Tables for the Clyde, &c., annually

Miscellaneous Works.

Charterer's Companion
 Tables of the Tonnage of Ships
 Foreign Exchange Tables

D. M'GREGOR & CO. *have much pleasure in submitting the following Letters, received from the Hon. the Lords Commissioners of the Admiralty:—*

HYDROGRAPHIC OFFICE,
ADMIRALTY, 15th AUGUST, 1861.

GENTLEMEN,

The Annual Trial of Chronometers for the use of Her Majesty's Government having now terminated, I am commanded by my Lords Commissioners of the Admiralty to offer you the sum of *FIFTY POUNDS* for your CHRONOMETER No. 2766.

I am, Gentlemen, your most obedient Servant,

A. B. BEECHER,
Captain, R.N.,

To Messrs D. M'GREGOR & Co., }
Chronometer Makers. } For Hydrographer.

—o—

HYDROGRAPHIC OFFICE,
ADMIRALTY, 29th AUGUST, 1864.

GENTLEMEN,

The Annual Trial of Chronometers for the use of Her Majesty's Government having now terminated, I am commanded by my Lords Commissioners of the Admiralty to offer you the sum of *FIFTY POUNDS* for your CHRONOMETER No. 3335.

I am, Gentlemen, your most obedt. Servant,

GEO. H. RICHARDS,
Captain, R.N.,

To Messrs D. M'GREGOR & Co., }
Chronometer Makers. } Hydrographer.

—o—

HYDROGRAPHIC OFFICE,
ADMIRALTY, 28th AUGUST, 1866.

GENTLEMEN,

The Annual Trial of Chronometers for the use of Her Majesty's Government having now terminated, I am commanded by my Lords Commissioners of the Admiralty to offer you the sum of *FIFTY-FOUR POUNDS* for your CHRONOMETER No. 3795.

I am, Gentlemen, your most obedt. Servant,

GEO. HENRY RICHARDS,
Captain, R.N.,

Messrs D. M'GREGOR & Co., }
Chronometer Makers. } Hydrographer.



